▲▲ THE IRON AGE ▲▲ July 27, 1933 ▲▲

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THE IRON AGE

JULY 27, 1933

Vol. 132, No. 4

The Acid Test

MORE than just the future of the iron and steel industry hangs upon the action in Washington at the coming steel code hearings, for in this administrative forum will probably be determined the fate of the open shop in America.

Against the clauses in this code relating to employee representation through company unions, organized labor will marshal its strongest political shock troops.

Having failed to successfully dictate in the case of the textile code, the labor lobby will fight its deciding battle with steel.

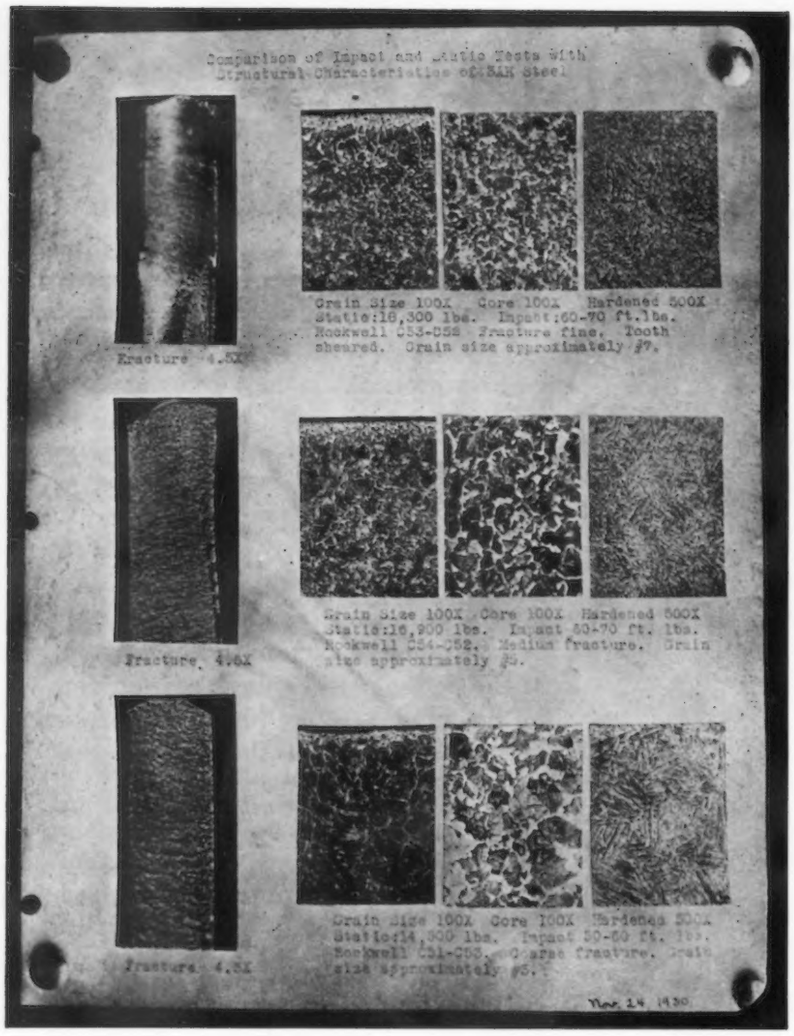
That is why industrialists far and wide, in every branch of industry, will follow the coming struggle with absorbed attention.

The result, as dictated by the administration's decisions, will determine whether industry will enter fully into the *spirit* of the act, or abide by the *letter* of the law.

If the great majority of American employers believe that the "New Deal" is a square deal which will not tolerate minority domination, the success of the Recovery Act is assured.

Heat Treatment of Steel Gears

By E. F. DAVIS
Metallurgist, Warner Gear Co., Muncie, Ind.


Comparison of Impact and Static Tests with
Structural Characteristics of SAE Steel
Fracture 4.5X
Grain Size 100X Core 100X Hardened 500X
Static:16,300 lbs. Impact:60-70 ft.lbs.
Rockwell C53-C58 Fracture fine. Tooth
sheared. Grain size approximately #7.
Fracture 4.5X
Grain Size 100X Core 100X Hardened 500X
Static:16,900 lbs. Impact 50-70 ft. lbs.
Rockwell C54-C52. Medium fracture. Grain
size approximately #5.
Fracture 4.5X
Grain Size 100X Core 100X Hardened 500X
Static:14,300 lbs. Impact 50-60 ft. lbs.
Rockwell C51-C53. Coarse fracture. Grain
size approximately #3.
Nov. 24 1930

AT the Warner Gear Co., selection of steel for gears is based on a definite program of grain size, which, in turn, is based upon machineability and impact strength. This group, representing the teeth of three different gears, shows the effect of grain size on hardness, impact value, fracture and static load values.

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WHEN we apply the term "heat treatment" we usually refer to the operations of carburizing, hardening and tempering after the parts are machined. However, the heat treatment of gears really begins from the time the scrap, lime and ore are dumped into the open-hearth or electric furnace and continue through all the subsequent metallurgical processes of casting, ingot heating and rolling, billet heating, and so on through the forging, normalizing and annealing. All of these are heat treating operations and all have an effect on the finished gear.

To treat all of these metallurgical operations is, however, beyond the scope of one paper. Hence, we will assume that the steel as delivered from the mill is of good uniform quality, satisfactory for gear purposes, and confine our attention to those metallurgical operations exterior to steel mill practice.

The material as furnished by the steel mill is in the form of bars or slabs. We can forge this with little disturbance of the flow lines in the original bar or we can orient these lines by upsetting in an upsetter direct from the bar or segment, or we can cut off slugs, up-end them and orient the grain in a board or steam hammer.

Since a gear is round in shape an orientation of the fibers radially is very desirable. One reason for this is that steel will move more in heat treatment parallel to the fiber than at right angles to it. An explanation for this phenomenon is that slip planes have been established in the rolling operation and although this is partially corrected by molecular rearrangement in subsequent heating yet this is the plane of least resistance should any unusual internal strains be set up by processing heat treatment. Although many good gears have been made from slabs, I have also examined a number of gears made from slabs, such as differential ring gears, and found almost invariably the greatest movement was parallel to the fiber.

Gear teeth are subject to fatigue and impact strains and the resistance to these stresses is greater at right angles to the fiber than parallel to it. A gear made of bar stock does not have the impact or fatigue value of an upset gear. A series of idler gears made of bar stock was examined for impact in our laboratory in comparison to a similar number of upset idler gears of the same kind. The material was S. A. E. 5150 chrome steel. The oil-hardened gears averaged 30 ft.-lb. impact. The same gears of upset stock averaged 55 ft.-lb.

Many years ago the Willys Overland Co. experienced some unexpected breakage on the rear axle pinion of its Model 90 car. The pinion was highly stressed, but as the model was in big production, redesign of the rear axle was impractical at the time. The company's metallurgist changed from a drop-forged pinion to an upset pinion and the breakage im-

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COMMENTS on the forging, normalizing, annealing and carburizing of gears are included in this part of Mr. Davis' paper, presented at the recent meeting of the American Gear Manufacturers Association.

Radial orientation of the fibers of the forged blanks is very desirable, and the amount of working and the finishing temperature are important. Incorrect normalizing is one of the principal sources of gear noise. Annealing is not to be regarded merely as a softening of the steel prior to machining, but as a means of obtaining the particular micro-structure that gives maximum machining results. A structure suitable for a gear produced on a Fellows shaper may not be best for one produced by hobbing, and one suitable for a spur gear may not be best for a helical gear. For carburizing, it is expected that continuous gas furnaces will predominate. These carburize at a cost of about 5 mills per lb., the chief factor in this cost reduction being the elimination of carburizing boxes and compound. The other half of Mr. Davis' paper, devoted to hardening and cyaniding, will be included in a subsequent issue.

▼ ▼ ▼

mediately stopped. The act of distributing the grain was all the difference between success and failure. It is estimated that steel is 15 per cent stronger in shear across the fiber than parallel to it. Its resiliance or toughness is also greater, which anyone can determine by bending a piece of sheet steel with the fiber and across it.

The temperature of forging is not so important as the amount of work and the finishing temperature. Steel should be forged high enough to be fully plastic in order to fill out the dies and make sharp cornered forgings. It is obvious that large forgings, such as crankshafts, must be heated hotter than an idler gear forging. The finishing temperatures should be about 1700 deg. F. If we heat a piece of steel to 2300 deg. F. the grain grows by prolonged heating to enormous size. If the steel is subsequently worked then the grain is reduced again and no harm is done. If it is not worked to any extent then the grain size remains large and the steel is weakened in a corresponding degree. It is obvious, therefore, that if the steel is not subject to much upsetting, such as the small end of a cluster gear for example, it should be forged at as low a temperature as possible. The cluster gear is one of the most difficult gear forgings to make correctly.

After a forging is once coarsened by heat is is difficult to normalize and reduce the grain size materially. Quick heats are better than slow prolonged heat for the element of time also enters into grain coarsening. There is a great deal of difference between pecking at a piece of steel with a light hammer and forging with a heavy steam hammer press. Using hammers which are too light does not give the grain the fine desirable density but varying grain size which is often a cause of gear distortion. Good working of steel improves the machinability and betters hardening properties. A gear made of bar stock never hardens as well as one made of a forging.

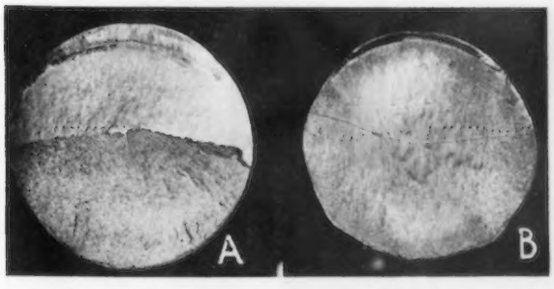
Incorrect Normalizing a Cause of Gear Noise

After forging, the gear blanks should be normalized. Gears annealed but not normalized always show more movement in the final hardening operation than gears which are both normalized and annealed. In fact, all our researches into the cause of gear distortion have shown that lack of correct normalizing is one of the principal causes of gear noise. Normalizing is done at temperatures from 1700 to 1850 deg. F. and consists of bringing the gears up to temperature, holding for 1 to 2 hr. at heat and then cooling at a fairly fast rate to prevent abnormal grain growth. In box furnace practice this consists of pulling the forgings out on the floor and allowing to cool in the air. In continuous furnace practice the forgings move out into an open air gap. The carburizing grades of steel should be normalized higher than the carburizing temperature in order to remove the distortion which would otherwise occur in the prolonged temperature of 1700 deg. F. in the carburizing boxes. Obviously it is better to remove this metal movement before the teeth are cut than to have it occur afterward.

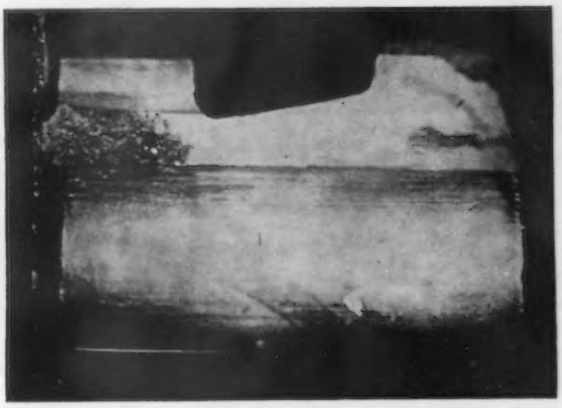
This gear cracked in hardening; the cause was traced to cold shearing of bars having a Brinell of about 300.

Each Type of Steel Annealed to Definite Structure

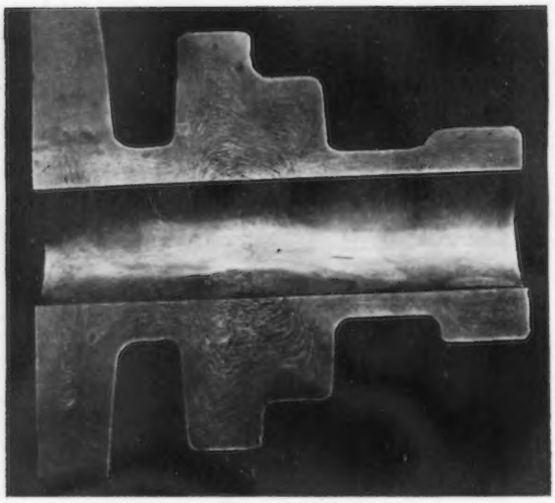
Annealing is a separate operation from normalizing; it does not consist of merely softening the steel so it can be machined but is a highly developed metallurgical science involving all the available knowledge of micro constitutents and metallography. Each type of steel must be annealed to some definite micro-pattern if the maximum machining results are to be obtained. Thus an S. A. E. 6150 or S. A. E. 5150 steel would machine best with a lamellar



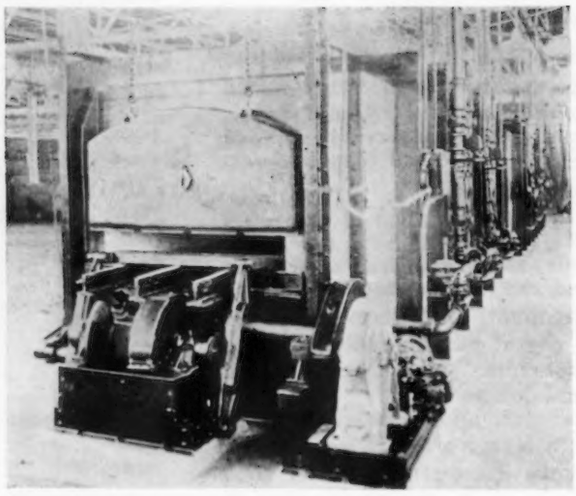
Effect of shearing cold has been given close study at the Warner plant. This illustration shows effect of shearing cold an S.A.E. 5140 steel bar. *A* shows the bar half sheared, half broken; *B* shows the crack that developed after cold shearing. Note that the crack in *B* follows the contour of the shearing line in *A*. Cold shearing is limited to gear steel bars 2 in. or less in diameter and 255 Brinell hardness.



Overheating and insufficient working has this effect on the end of a cluster gear forging.



Macrograph of cluster gear showing good upsetting practice. Since a gear is round in shape orientation of the fibers radially is very desirable.



Charging end of closed-gap combined normalizing and annealing furnace equipped with six thermocouples to facilitate control of cooling rate and obtaining of structure desired.

pearlitic pattern. An S. A. E. 2345 must be slightly sorbitic. S. A. E. 4640 will not form lamellar pearlite and will be spheroidized pearlite with a blocky ferrite. The function of the gear metallurgist is to determine which structure produces the best reactions in gear cutting and then to manipulate his furnace until this structure may be obtained consistently. A furnace cycle is thus established and all subsequent lots of steel are run through on this cycle. Unfortunately, various heats of steel vary in characteristics and it is frequently necessary to modify the cycle. Hence, the operation requires constant attention.

Same Structure Not Suitable

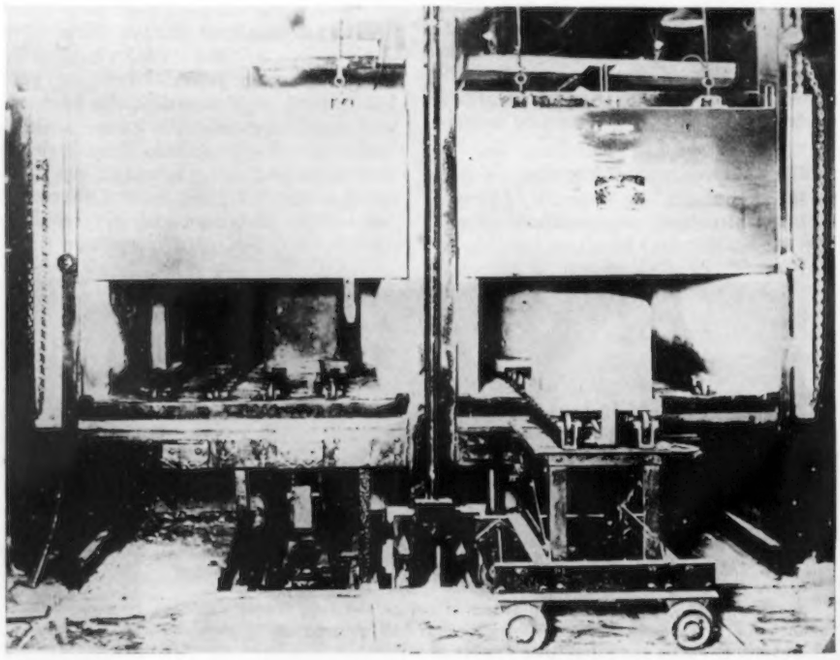
A structure suitable for gears generated in a Fellows machine may not be the best for a hobbed gear, and the structure suitable for a spur gear may not be the best adapted for a helical gear. We make cluster gears having both helical and spur gears on one forged unit. Our gear department claims that when the spur gears are somewhat rough helical gears are the smoothest and when the spur gears are smooth the helical gears do not have a desirable finish.

In determining the correct annealing structure, blanking, drilling and broaching must be subordinate to gear cutting but, of course, these production operations must not be difficult to perform either. However, variations in the rake and clearance are easily made with any tool but the gear cutter, being an accurately formed tool, cannot be changed in clearance and only a few degrees in the angularity of the rake for if it is changed too much it will not generate good involutes. When we consider that in gear cutting the tolerance in tooth form variables is seldom over 0.0008 in error it may readily be understood that we can do little with cutter corrections.

Carburizing

The carburizing operation consists of impregnating the surface of the steel with carbon for which it has an affinity when the steel is heated. The depth of this penetration will vary from 1/64 to ⅛ in., depending upon the time and temperature at the carburizing heat, which is usually within the range of 1650 to 1750 deg. F. At a certain temperature and a definite time the carburizing penetration should proceed at a fairly uniform rate. If it does not, we regard the steel as abnormal. Abnormal steels are oxidized steels. Hence, we assume that the carburizing gases, which are usually carbon monoxide, are unbalanced by the necessity of attacking the oxygen first and removing it and thus upsetting the chemical equilibrium. We thus have a peculiar crowding of carbide in the outer zone and a distorted cementite. We may compare it to the damming of a river with ice for the oxygen prevents the normal flow of carburizing gas.

Although we associate pack hardening with solid carburizer the actual phenomenon is chemical and is done with a carbon-bearing gas. A box packed with solid carburizing material should be regarded as a gas generator produced by a burning of the carbonaceous material with lim-

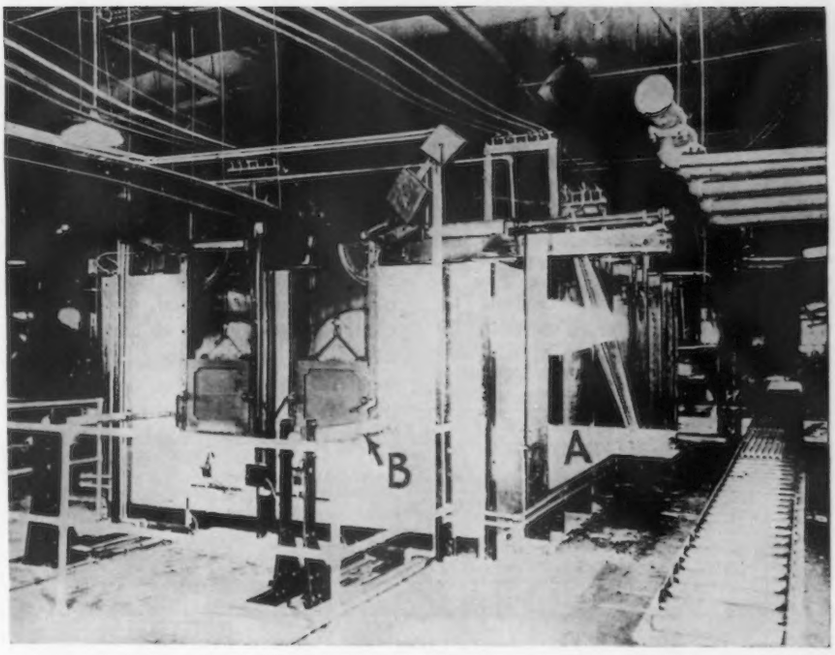


Front view of return counterflow carburizing furnace. Two different units are shown. The boxes enter the furnace on one set of rails and come out of the same doorway on the adjoining rails. Front pushers are shown below the level of the hearth.

ited oxygen so that carbon monoxide is produced. If it does not generate the gas fast enough to produce the correct C, CO and CO_2 ratio then it may become excessively high in CO_2 which would decarburize. In spite of a gear being surrounded by solid carbon it is possible to decarburize a gear in a carburizing box if it becomes too weak in gas generation. Some types depend on the dripping of hydrocarbon liquids such as aniline. The continuous types utilize methane, propane or butane mixed in the correct ratio with flue gas of CO_2.

Continuous-Type Furnaces Employed

There is seldom any change in a gear during the carburizing operation providing the temperatures are held fairly uniform and the steel has been correctly normalized. However, in stationary furnace practice it is impossible to obtain uniform heating rate and uniform temperatures in the various boxes in one furnace. Some years ago the author made a test in a carburizing furnace loaded with eight boxes of work. A thermocouple was placed in each box and in addition the regular furnace thermocouple was used as a check against the interior temperature. Variables as high as 410 deg. F. were obtained during the early part of the heating period and temperatures varying 120 deg. F. at the termination of the carburizing cycle. In fact, one of the eight boxes exceeded the temperature of the furnace reading by 35 deg. F.; this probably caused by internal combustion. This condition was recognized a number of years ago by metallurgists and box furnace practice is now practically obsolete except in small gear plants whose production does not warrant the expenditure for continuous furnaces.



Rear end of return counterflow furnace showing the side pusher, *A*, and the rear pusher, *B*. The side pusher is connected with the transfer car inside of the furnace for moving the carburizing box and tray to the exit rails. The rear pusher moves the boxes through the furnace.

The continuous furnaces used in gear carburizing are the rotary type, the straight through tunnel type, the counterflow and the return counterflow, sometimes called the boomerang furnace because the work comes out the same door it enters. This latter type of furnace will carburize at a cost of less than 1c. per lb. The gas continuous furnaces will, no doubt, supplant these furnaces, for these will carburize at a cost approximating 5 mills. The chief factor in this cost reduction is the elimination of carburizing boxes and compound. Variables within 0.010 in. in case depth do not seemingly affect distortion. Sometimes results in the shop indicate that these variations are factors in distortion, but research does not indicate that it is important.

Grain Sand Structure and Mold Permeability Control

THE shape of molding sand grains and the art of mixing different size grains have a decided influence on permeability, according to Harry W. Dietert and Frank Valtier of the Dietert-Detroit Co., Detroit, who presented a paper, "Grain Structure Control Insures Mold Permeability Control," at the annual convention of the American Foundrymen's Association in Chicago, June 20 to 23.

It is well known that the permeability of production sand or of a mold will decrease rapidly with the slightest decrease in fineness, but to increase permeability by adding a coarser sand is very slow and requires additions in large quantities. Permeability may be augmented rapidly by reducing the amount of fines, for example, material retained on sieves 200 or finer. The behavior of sand mixtures may be better understood by comparing the relation between grain structure and base permeability in place of using mold or green permeability, since base permeability eliminates variations such as may be caused by moisture or clay content.

The effect of the shapes of sand grains on permeability is a problem which often comes up. Various test values for rounded and angular sand grains, when mixed with bonding material by the muller, are given in the table. It is an interesting fact, the authors state, that the permeability, whether base, green or dry, is higher in each case by at least 20 per cent for the rounded grains than for the angular. This is entirely natural since rounded grains produce maximum void space.

EFFECT OF GRAIN SHAPE ON SAND PROPERTIES

	Rounded Shape	Angular Shape
A.F.A. average fineness..	50	50
Approx. surface area, sq. in. per cu. in. of sand	10,000	15,000
Base permeability.....	200	160
3 per cent moisture, 8.39 per cent clay:		
Green permeability....	150	120
Dry permeability.....	170	140
Green compression, lb..	9.8	11.3
Dry compression, lb...	29.9	39.0
Green tensile, oz.....	16.0	16.5
Oil-bonded core, 1-56 ratio tensile strength—lb..	268.0	185.0

By means of graphs the authors illustrate the relation between grain size and base permeability; the increase or decrease of permeability by

(Concluded on Page 64)

Growth of Cast Irons at High T

At temperatures above the critical transformation range of cast iron, the atmosphere in which heating takes place has a marked effect upon the extent to which growth occurs. The data in Table III show the effect of an oxidizing atmosphere (carbon dioxide) at 1500 deg. F. (815 deg. C.) upon several cast irons. Curves plotted from these data are shown in Fig. 5.

It will be observed in these curves that the Ni-Cr cast iron (2349) possesses improved growth-resistant properties, the action of the chromium being to delay the decomposition of the combined carbon. Nickel in amounts up to 4 per cent (2335) has little direct influence upon the rate of growth of cast iron, but the principal advantage lies in the fact that growth-resistant compositions can be made gray and machinable by the addition of Ni.

The "Ni-Tensyl" cast iron (not shown in the curves), although having the graphite flakes in a desirable form, was found to be unsuited as a growth-resistant material under oxidizing conditions in this temperature range because of its high silicon content.

The growth of the Ni-Resist iron (2317) is practically negligible.

The mechanism by which growth takes place in oxidizing atmospheres is illustrated by Fig. 6, which is a photomicrograph of the structure of a plain 2 per cent Si cast iron which had been heated to 1500 deg. F. and cooled 12 times. It will be observed that throughout the region of the graphite flakes there is a gray-toned constituent which projects irregularly into the matrix of the iron. This gray-toned constituent is considered to be a mixture of silica and iron oxide, and is the result of the oxidizing action of the gases which penetrated the iron along the graphite flakes. With the graphite passageways and adjacent areas thus clogged with this oxidizing material, the iron is unable to contract normally when it is cooled, and consequently the phenomenon of growth is observed.

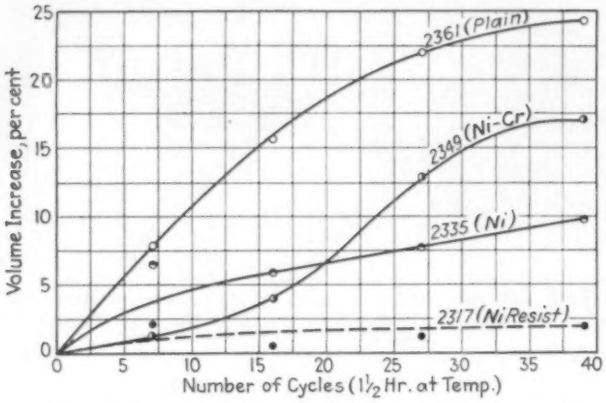


Fig. 5—Nickel cast irons show resistance to growth in an oxidizing atmosphere of carbon dioxide at 1500 deg. F.

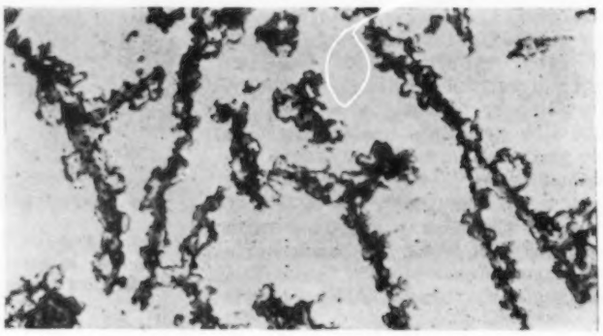


Fig. 6—Unetched structure of a grown 2 per cent silicon cast iron; 500 magnifications.

Fig. 7—Dispersed form of graphite unfavorable to growth; 500 magnifications.

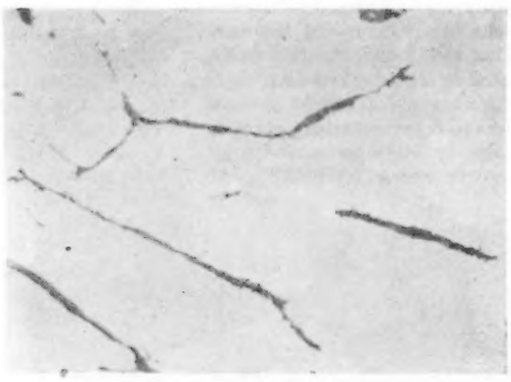


Fig. 8—Long, flaky form of graphite favorable to growth; 500 magnifications.

Table III—Growth of Cast Iron in an Oxidizing (CO_2) Atmosphere At 1500 Deg F. (815 Deg. C.)

Heat No.	Type	Analysis TC	Si	Ni	Cr	Cu	Volume Increase After Indicated Number of Cycles, Per Cent 7	16	27	39
2361	Plain	3.26	2.02	....	....	....	7.87	15.62	22.08	24.39
2349	Ni-Cr	3.43	1.08	2.33	.49	....	1.36	3.96	12.59	17.10
2325	Ni	3.82	0.45	3.97	....	....	6.54	5.99	7.62	9.76
2317	Ni-Resist	2.88	1.72	14.31	3.92	5.37	2.17	0.59	1.30	1.99

gh Temperatures

By THOMAS J. WOOD
Bayonne Laboratory
International Nickel Co., Inc.
Bayonne, N. J.

NOT only high temperatures to which a casting is subjected in use, but the character of the atmosphere surrounding it, have a profound effect in promoting deterioration and growth. The author, in the light of the literature on the subject and extended tests in the research laboratory of the International Nickel Co., brings to a focus the causes of casting growth and finds that additions of nickel will produce strong, growth-resistant, machinable castings. The accompanying article is continued from page 12 of THE IRON AGE of July 13, where the discussion covered applications of castings below 1100 deg. F.

Moreover, the resistance to contraction offered by the presence of the silica and iron oxide sets up stresses in the iron which result in tiny fissures and cracks, which, of course, offer new planes of attack on subsequent heating. The respiratory or "breathing" effect to which the iron is subjected on passing through the critical range, as suggested by Benedicks and Löfquist, may also be appreciated as a powerful aid in furthering the penetration of the oxidizing gases into the iron.

It now follows that the size, shape and distribution of the graphite flakes are of importance in a cast iron which is to be subjected to heat. The long, inter-twining graphite flake form is conducive to growth in that it affords an excellent passageway for the penetration of gases. A cast iron which contains short and well-dispersed graphite flakes, however, is in a better position to resist growth. A comparison of Figs. 7 and 8 will serve to demonstrate the structural advantages which the well-disseminated graphite form offers.

In connection with the growth tests of cast iron under oxidizing conditions, scaling tests were also made. The procedure consisted essentially in determining the amount of scale formed on the specimens after definite exposure intervals. The data secured on these scaling tests are shown in Table IV; curves plotted from these data are given in Fig. 9.

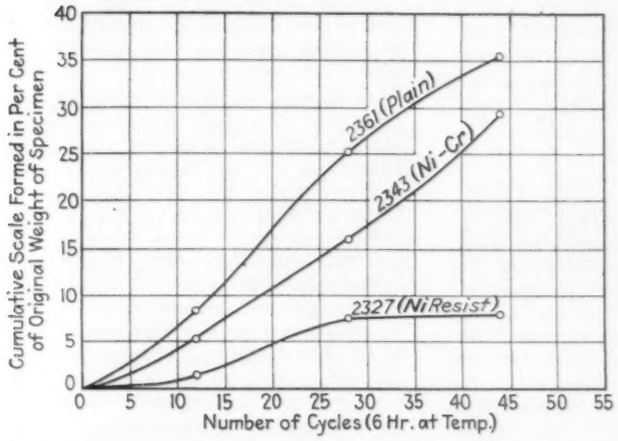

Cumulative Scale Formed in Per Cent of Original Weight of Specimen
Number of Cycles (6 Hr. at Temp.)
2361 (Plain)
2343 (Ni-Cr)
2327 (NiResist)

Fig. 9—Inhibition of scale formations in cast iron (oxidizing atmospheres at 1500 deg. F.) is important in applications requiring the transfer of heat.

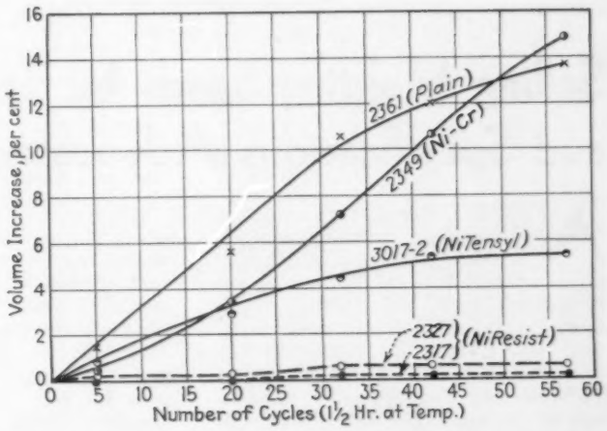


Fig. 10—All of the irons were not affected in the same degree in illuminating gas at 1500 deg. F. Silicon appeared to play no important part in this type of growth.

It is apparent in these curves that the Ni-Cr cast iron (2343) is definitely more scale-resistant than the plain iron (2361). The Ni-Resist iron (2327) shows still further improvement in resistance to scale formation. Small amounts of nickel (less than 4 per cent) were found to confer no particular advantages with regard to the resistance to scaling of cast iron.

The ability of an iron to resist this formation of scale is of considerable importance in applications requiring the transfer of heat, due to the fact that the efficiency of the operation is

Table IV—Scaling of Cast Iron in an Oxidizing Atmosphere at 1500 Deg. F. (815 Deg. C.)

Heat Number	Analysis TC	Si	Ni	Cr	Cu	Type	Original Weight of Specimen in gms.	Grams of Scale Formed After Indicated No. of Cycles 12	28	44	Cumulative Scale Formed; Per Cent of Orig. Wt. of Specimen 12	28	44
2361	3.26	2.02	....	....	....	Plain	115.49	9.81	29.36	41.24	8.50	25.4	36.6
2343	3.53	1.97	1.52	.40	....	Ni-Cr	114.13	5.98	18.45	33.61	5.25	16.15	29.5
2327*	2.60	.48	13.17	1.48	6.50	Ni-Resist	122.49	1.83	9.22	9.73	1.50	7.56	7.95

* While this particular test sample was low in silicon, it may be stated that the standard 1-2 per cent Si Ni-Resist composition is more satisfactory in that it requires no special foundry mixtures and produces equivalent results.

appreciably reduced by the thermal insulation which scale provides.

The growth of cast iron in illuminating gas at 1500 deg. F. (815 deg. C.) was also investigated. Under these conditions it was ascertained that growth took place by a rather peculiar process. In certain specimens it appeared that the illuminating gas had penetrated the irons along the graphite flakes, and had then broken down to deposit free carbon. This, of course, created a condition similar to the clogging of the graphite passageways by the oxides as previously described, so that the result was growth of the iron.

The data secured are shown in Table V, while the curves plotted from these data are shown in Fig. 10.

With respect to oxidizing atmospheres it has been ascertained that growth-resistant compositions may be made gray and machinable by the addition of sufficient amounts of nickel. The combination of Ni and Cr is also useful in cast irons for the retardation of growth. Unusually good resistance to permanent expansion is offered by the austenitic Ni-Resist iron.

Table V—Growth of Cast Iron in Illuminating Gas at 1500 Deg. F. (815 Deg. C.)

Heat Number	Type	Analysis TC	Si	Ni	Cr	Cu	Volume Increase After Indicated No. of Cycles, Per Cent 5	20	32	42	57	Avg. TC Content at end of 57 Cycles
2361	Plain	3.26	2.02	....	....	....	1.55	5.77	10.06	12.08	13.78	4.60
2349	Ni-Cr	3.43	1.08	2.33	.49	....	0.46	3 43	7.19	10.64	14.9	4.82
3017-2	High Strength	2.81	1.88	1.84	....	....	0.83	2.90	4.47	5.41	5.48	3.32
2327	Ni-Resist*	2.60	0.48	13.17	1.48	6.50	0.27	0.27	0.63	0.63	0.63	2.85
2317	Ni-Resist	2.88	1.72	14.31	3.92	5.37	0	0	0.23	0.15	0.20	3.17

* See footnote on Table IV

For resistance to growth in carbonaceous atmospheres it is necessary to have either a well-dispersed graphite flake formation, such as is obtained in the high strength Ni-Tensyl iron, or a matrix similar to that of Ni-Resist, which does not tend to "crack" the gas to form free carbon.

(A third and last part of this article will include tabulations of recommended nickel-alloy cast irons for different general and specific applications.)

Selling Molding Sands by Tests and Specifications Advocated

A STRONG plea for the sale of all molding sands by analysis is found in a paper, "Application of A.F.A. Sand Testing by the Producer," by C. M. Hardy, president, Houghland & Hardy and Hardy Sand Co., Evansville, Ind., presented at the recent annual convention of the American Foundrymen's Association in Chicago. The practice of selling molding sand by sample and without specification and analysis is as outmoded today as the old practice of selling pig iron by fracture, insists the author. Despite the numerous papers and discussions on foundry sand, he stated that too little has been said about the importance of controlling molding sand at its source.

Unless sand is accurately produced and shipments are uniform, the foundry man will have difficulty in controlling his heaps, and losses are sure to take place in the foundry. The control of heaps with sand of known uniformity is much simpler than to attempt control with an unknown, non-uniform product. This control of uniformity in the sand as shipped can be secured by the producer only by analyzing every shipment for permeability, strength, clay content, grain distribution and moisture. More than one test of each car is essential; frequent tests for permeability and strengths are necessary to show if the desired analysis is being maintained. Moreover, a record of all tests should be preserved.

All deposits of molding sand are non-uniform when considered as a whole, says the author. The clay content, as well as the strength and permeability, may vary greatly, although the grain structure may be rather uniform. Other deposits may vary in grain structure. As the pit is extended either farther along the sand structure or into it, the deeper the top soil covering the sand, the greater will be the clay content of the underlying sand itself. Permeability increases and strengths decrease as tests proceed farther down the pit. The exact opposite is true of other deposits. In still other deposits the stratum of molding sand is very shallow and almost uniform in analyses from top to bottom at any position, but varies with the topography in clay content, strengths and permeability. Thus constant testing is necessary.

With analyses of variations in deposits before him, it is necessary for the producer, says Mr. Hardy, if uniformity in component parts is to be maintained, to work out a method whereby he has a pre-determined analysis of permeability, clay content, strengths and grain distribution of the entire deposit and to maintain a well-ordered chart. Fortunate is the producer who has deposits of various light, medium and heavy grades in which each grade may be obtained in different clays, permeabilities and strengths, together with the natural silicates of each sand, all within a radius enabling him to deliver them to one central mill where they may be blended. If molding sand is to be uniform and produced to meet definite specifications, it is necessary to have some very accurate way to proportion the different sands and natural silicates so as to bring them together simultaneously in the direct ratio each kind bears to the whole.

"Rule-of-thumb" methods of inspection—taking a well-chosen, nicely tempered sample of sand that has been carefully rubbed through the hands, put in a container and handed to the foundry man who has only the look and feel of sand to judge by—no longer are used. The appearance of a molding sand is often very deceiving.

Answering the query, "What is the advantage of buying by analysis when we do not have testing equipment in our foundry?" Mr. Hardy says: "The A.F.A. terms are the grounds on which producer and foundryman meet understandingly. Most foundry men are familiar with the A.F.A. terms of permeability, strength, clay content, grain distribution, pan material and moisture content, and their direct relation to castings. They know what they want and so, in ordering from any producer, it is to their advantage to be familiar with A.F.A. testing and specifications. ("Testing and Grading Foundry Sands," A.F.A. 1931.) In turn, they have a right to expect the producer to have a comprehensive understanding of these terms and their application to molding sand problems.

A portion of Mr. Hardy's paper is devoted to a discussion of tolerances in specifications. A wide shipping tolerance in such specifications should not be necessary. The closer shipments can be held to given specifications that have proved successful in actual foundry practice, the less grief for the foundry. The author's discussion of tolerances covers clay content, shear, compression, permeability control, pan material, grain fineness and fusion point. The number of points tolerance in each case is given.

In conclusion Mr. Hardy states that, if the use of the sand in the foundry and the production of sand at its source are to be improved, the full cooperation between producer and consumer is paramount, through the medium of tests, analyses and specifications.

New Developments Lower Cost of Continuous-Furnace Brazing

By C. L. WEST
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Electric Furnace Co., Salem, Ohio

WITH the development of a low-cost reducing atmosphere, together with the necessary furnace equipment, it is expected that the continuous-furnace brazing of steel assemblies will be much more widely applied than heretofore. Being cheaper, the new reducing gas may be used more extravagantly, and this, it is stated, permits use of furnaces of more simple design, with economies in operation and maintenance. Data on different brazing materials and on the fitting and preparation of the parts to be joined, as well as on the operation and scope of furnace brazing, are given in this article.

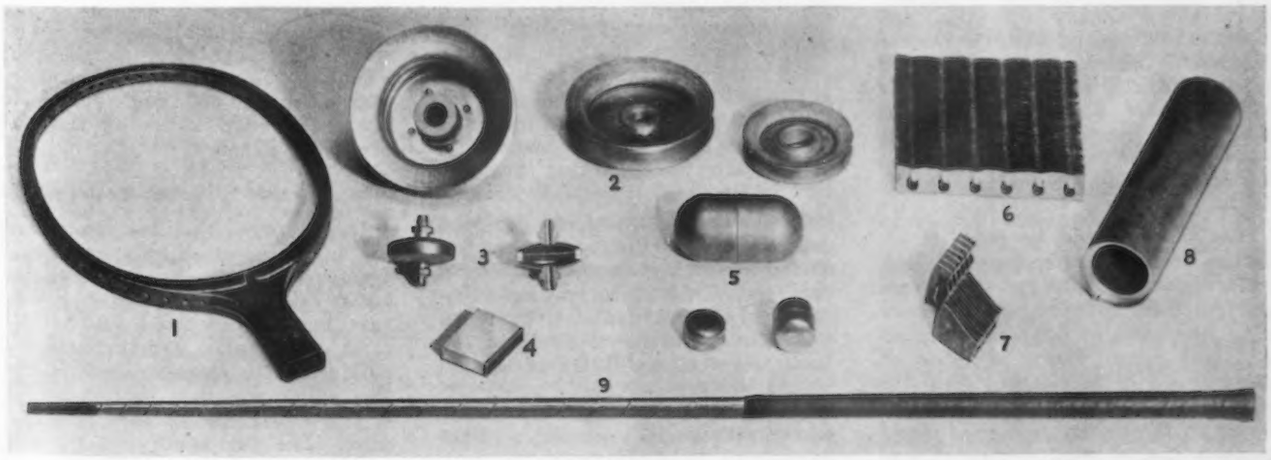
THE necessity for lowering manufacturing costs, while at the same time increasing the quality of a finished product, has led during recent years to developments in the brazing together of steel parts by heating to a relatively high temperature in an atmosphere which will eliminate oxidation during such brazing operations. But the cost for the necessary atmosphere to protect the parts has been high, and therefore application of the process has been more or less limited. With the recent development by the Electric Furnace Co., Salem, Ohio, of an inexpensive gas atmosphere, together with the necessary furnace equipment, the field of economic application has, however, materially widened. It is now possible in numerous cases to replace present joining methods economically, and also to bring down the production cost of many parts which are now made in a single piece by making them in two or more pieces, followed by continuous brazing.

This joining of steel products such as stampings, forgings and screw machine parts by brazing is accomplished in electric furnaces with controlled reducing gas atmosphere at temperatures ranging from 1400 to 2100 deg. F. Primarily, a furnace brazing operation consists of heating any assembly of parts to the melting point of the brazing medium used in a reducing atmosphere and cooling of the parts in the same atmosphere to a temperature at which the parts will not oxidize in air upon removal from the cooling chamber.

Brazing Materials Used

Brazing materials utilized include silver solders, brass alloys and copper. Silver solders, because of their comparatively low melting temperature of 1400 to 1600 deg. F., are used where higher temperatures would be detrimental to the parts forming the brazed assembly. The silver solders form a very strong bond between steel and other metallic parts. The material is furnished in wire or thin ribbon form at a cost of approximately $2 a lb.; because of the high cost, its use is frequently avoided where cheaper alloys can be employed satisfactorily.

Brass wire and brass powder are used extensively where a very strong bond between the parts of the assembly is the prime consideration. Brazing with brass wire is accomplished at a temperature of 1740 deg. F. in most cases, and the resulting joints have the normal strength of mild steel. Where brass powder is used the brazing temperature closely approaches 2000 deg. F. due to the rapid volatilization of free zinc from the powder at elevated temperatures, with result-



PARTS furnace-brazed successfully include the tennis racquet frame, pulley, filter, float, condenser, muffler and golf shaft shown in this illustration. No. 4 is a piece of S.A.E. 1045 steel to which is brazed a strip of manganese bronze. The parts were assembled with a ribbon of silver solder between them, heated to 1500 deg. F. in a reducing atmosphere, and quenched in water. The steel was hardened and the steel and bronze strip were brazed so tightly that it was impossible to separate the parts without cutting

ant increase in the melting temperature of the residue of the copper-zinc mixture when the steel parts finally reach the brazing temperature.

The brass alloys are cheap, being obtainable for all general purposes at approximately 15c. a lb., prepared for use. They are not always satisfactory, however, for brazing refrigerator parts which contain gases or liquids and are subjected to relatively high pressures. Tests are usually from 600 to 1000 lb. Failure in this respect is probably due to the fact that such brass alloys continue to give off zinc during the entire brazing cycle, or up to the time of solidification, and minute pores are sometimes found in the film of alloy left in the joints after brazing. These failures are not necessarily frequent, but they cannot occur in the manufacture of refrigerator parts and other mechanisms where high pressures are encountered. For this reason commercially pure copper is used in the brazing of such parts.

Copper in the pure state offers the most perfect brazing medium where the strongest and tightest bonding of steel parts is essential. It is used in wire, ribbon and powdered form, and as it is free from alloying agents, the melting temperature is very consistent in any form. The disadvantage of using copper as a brazing medium is that the operation is carried out at the high temperature of 2100 deg. F., which naturally tends to increase the maintenance cost of furnace alloys over that encountered at temperatures of 1740 deg. and lower.

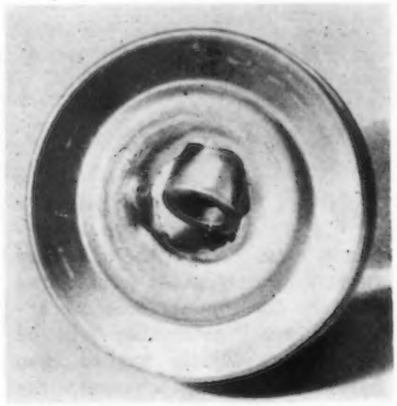
Fitting and Preparation of Parts To Be Brazed

The parts which are to form a brazed assembly should be fabricated in such a manner that the joints fit closely together. Light press fits are very desirable, and extremely tight fits will aid a perfect flow of the brazing material into the joint. Capillary attraction plays an important part in the brazing operation and hence the tighter the joint, the farther the molten metal will flow. On the other hand, void spots or gaps in any assembly are always difficult and many times impossible to seal due to the dependence on capillary attraction for drawing the molten metal into the joints.

The parts should be clean if effective brazing is to be expected. The reducing action of the gas atmosphere used in these furnaces will normally clean the parts of light oxides or oil and soot films. Heavy scale or oil deposits should be removed from the parts before assembly. A heavy scale, even if thoroughly reduced, would leave a film of very absorbent iron on the surface, and the possibility of the molten copper penetrating through this film and bonding with the solid steel is doubtful. Where such a union may be possible with excessive amounts of copper, the result would not always be dependable. Heavy oil, grease or soot deposits are likely to leave a deposit of carbon upon the surface of the metal which is detrimental to good brazing.

Simpler Furnace Used With New Reducing Atmosphere

Furnaces of relatively simple design have been installed for brazing the parts referred to in this article. For brazing operations up to 1800 deg. F.,



IN this test the furnace-brazed joint proved even stronger than the original parts, the steel pulley having failed while the brazed joint held securely.

an electric furnace utilizing a belt conveyor of heat-resisting alloy is commonly used for heating and conveying the work. When the brazing temperatures are as high as 2100 deg. F., simple pusher-type furnaces are usually employed, in which the work is conveyed through the heating and cooling chambers on light shoes or trays of heat-resisting alloy.

In any case the equipment consists of a heating chamber in which the work is heated to the desired brazing temperature, with a cooling chamber attached through which the work passes after leaving the furnace proper. The cooling chamber is usually of double steel shell construction, the inner chamber being filled with the gas atmosphere, and water is circulated between the inner and outer shells as a means of forcing the cooling of the material to a satisfactory discharging temperature in the shortest possible time.

Until recently hydrogen gas was used almost exclusively for the reducing atmosphere in electric brazing furnaces. This type of gas has satisfactory reducing qualities, but is a serious decarburizer of steels at elevated temperatures. It cannot be used in the presence of steels where decarburization is an important factor except with special preparation of the parts, such as electroplating the surfaces of the product before processing in the hydrogen atmosphere. Hydrogen gas costs from $1 to $10 a 1000 cu. ft., depending upon the method of production and the quantities used. A small furnace installation may require from 300 to 500 cu. ft. an hour with the result that the furnace design, with regard to entrance and exit openings, may become quite complicated in order to use the gas as sparingly as possible.

A low cost reducing atmosphere, which is produced at the brazing furnace location, utilizing a gas producer of a size to suit each installation, has been developed by the Electric Furnace Co. Its cost as produced by the company may vary from 20c. to 30c. a 1000 cu. ft., depending upon the cost of electric energy and base materials in the locality where the gas is produced. Such a cheap gas atmosphere can be used somewhat more extravagantly than more expensive gases, and furnace equipment can be of simple character, resulting in lower first cost and lowered operating and maintenance cost of such equipment.

Brazing Operation Explained

To illustrate the operation, with the brazing of a hub and pulley assembly such as used on automobile fans, a continuous belt-conveyor type electric furnace with reducing gas atmosphere might be assumed. The parts are assembled with a light press fit and a single strand or ring of brass wire, 1/32 in. diameter, is placed around the hub at a point adjacent to the steel pulley. The pulley assembly is placed upon the moving conveyor belt and carried into the furnace, which is operating at a temperature of 1740 deg. F. At approximately three-fourths of the distance through the furnace the steel parts reach the furnace temperature and the brass alloy is then in a very liquid state. Capillary attraction and force now come into play, and the molten metal is drawn through the joint between the pulley and the hub and further forced out under the flange, thus wetting the entire surface in contact, while the surplus forms a fillet at each end of the joint. The work then moves out of the furnace and into the cooling hood, during which time the film of iron and copper alloy in the joint solidifies. The work is then cooled to approximately 250 deg. F. in its passage through the cooling hood and the job is complete.

Joint Exceeds Strength Requirements

It was found that the strength of the brazed joint in this case many times exceeded the requirements. An automobile manufacturer reported that "in a torsion test a load of 5160 ft.-lb. was applied and the weld still held, the ¾ in. diameter shaft failing. The pulley was then held on outside of hub and a load of 7190 ft.-lb. applied. The weld again held, the bolts on the driver shearing. The test was discontinued, it being the opinion that the weld had a satisfactory safety factor under the actual working load."

(Concluded on Page 66)

Indiscriminate Use of Corrosion Test for Stainless Steels Is Harmful

By V. B. BROWNE
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NO accelerated corrosion test has a universal application, and that applies to any such offered for stainless steels, but, says the author, each has its value when intelligently applied. Differences of behavior of metals under test and in actual service may be due, he suggests, to different electrolytic actions owing in turn to different potentials in the electrochemical series according to the electrolyte present.

In particular the accompanying article discusses the corrosion of stainless steels, especially in the region of welds. The use of columbium in the alloy is advanced as a retarder of intercrystalline precipitation, the phenomenon that is regarded as the cause of corrosion failures.

THE folly of accepting the results of a general accelerated corrosion test as a measure of what will occur in service was exemplified in the case of the sulphuric acid test which was used some years ago to forecast the possible life of steel under all conditions of service. The results of this test definitely indicated that a very poor grade of steel would outlast the finest Swedish irons many, many times — a conclusion which was obviously ridiculous.

Similarly, the salt spray test which was primarily designed for testing the continuity of a galvanized coating, functioned admirably for this purpose, but when applied as an accelerated test to determine the resistance to corrosion for general purposes, it failed miserably. However, when this test is used specifically, as the U. S. Navy uses it, to measure the resistance of a metal to the corrosion of ocean water, the results can be accepted as a fairly accurate measure of the life of a material under such conditions.

Engineers and metallurgists have searched diligently for some single accelerated test which might be used as a fairly accurate measure to determine the relative corrosion resistance of various metals under normal commercial service, but it is safe to say that so far no test has been worked out which can be used for such a purpose. One must conclude that each accelerated test indicates nothing more than what is likely to occur in service with the same medium and under identical conditions. Even a slight change in these conditions, as for example, temperature or concentration, is likely to give an entirely different result.

No Satisfactory Accelerated Corrosion Test

WHEN we have to deal with metals of a high resistance to corrosion the problem becomes more and more difficult. The chrome steels and the chrome-nickel steels, which by general consent have all been classified under the common nomenclature of stainless steels, are exceedingly resistant to the ordinary corrosive media encountered in service, and no accelerated test has yet been devised which will forecast what will happen, except when the conditions of the service are identical with the conditions which exist in the test, or when the results of the test have been standardized with some given service.

For example, the Brearley copper-sulphate test, designed to test stainless cutlery, and used by Brearley as a definition of the word stainless, only indicates that if this steel were hardened, tempered and polished and does not become plated with copper when immersed in this solution, it is reasonably safe to assume that the article of cutlery can be used for domestic service and specifically to resist the action of fruit juices and vinegar. It does not, however, indicate that the material is stainless, as defined in the dictionary, and as a matter of fact stainless steel which conforms to all the requirements of cutlery tests will, under many conditions of service, stain and rust very badly.

Of all the stainless steels the most resistant to corrosion is the austenitic chrome-nickel steel containing approximately 18 per cent chrome and 8 per cent nickel. When this steel was developed and commercial processes worked out for its manufacture and fabrication, it was hoped that it would solve more of our corrosion problems, because of its properties, which more nearly approach, from the standpoint of corrosion resistance, those of the noble metals. It was practically untarnishable under ordinary service, and was only soluble in certain mineral acids, and some of their compounds.

It developed, however, that this metal was susceptible to a disease which under certain conditions impaired its resistance to corrosion. The effect of this disease was somewhat analogous to season cracking of yellow brass, and was brought about when the material was used in a temperature range from 800 to 1500 deg. F. and subjected to an active corrosive agent. Even when the

metal was merely heated to a temperature within this range and afterward subjected to corrosive conditions when cold, it would be affected to a point where failure frequently occurred.

The Disease of Inter-Crystalline Embrittlement

THE change which occurs when this particular steel is heated within the above temperature range is a structural one, and perhaps it will be apropos to describe briefly this particular phenomenon, for the benefit of readers who are not familiar with it. Austenite, named after its discoverer, Prof. Austen, is a solid solution of iron and carbon. It is non-magnetic and unstable in low-carbon steels except at temperatures above 1750 deg. F. It exists only when the steel is maintained at high temperatures, and as soon as cooling takes place this constituent breaks up or dissociates into two constituents, iron carbide and ferrite.

When certain elements are added to the iron and carbon alloy, the stability of this constituent is considerably increased. For example, when chromium and nickel are added to the extent of 18 and 8 per cent respectively, the resulting alloy is rendered stable enough that if cooled rapidly the austenite persists to ordinary temperatures, but if cooled slowly or heated to a temperature within the range of 800 to 1500 deg. F. dissociation will take place, and the carbide will be precipitated, usually between the grain boundaries. When this takes place subsequent heating to a temperature above the dissociation temperature followed by rapid cooling will again render the alloy completely austenitic.

It is this dissociation of austenite into ferrite and a carbide that causes the disease mentioned above. The extent to which dissociation occurs is governed by the time and temperature of heating, and to a limited extent by the composition. The influence of modifications of the composition only affects the time element by retarding the process of dissociation, and therefore, such modifications have a distinctly restricted value.

Irrespective of composition, this material when heated for a sufficient length of time within the above range will dissociate and the disease will develop if the metal is in contact with a corrosive agent sufficiently active to produce it. This disease has been termed inter-crystalline embrittlement, and manifests itself either by the formation of cracks along the crystal boundaries of the metal, or in severe cases by complete disintegration, in which the intergranular constituent is destroyed or dissolved and the crystals fall apart in the form of powder. This disease rarely occurs unless the material is heated within the range mentioned, or cooled slowly from above the range.

Disease Prevention a Factor in Welding

UNFORTUNATELY in the fabrication of many articles from this metal, it is not only necessary but highly desirable to weld, which involves heating the area contiguous to the weld, to temperatures within this range. Equipment so fabricated will develop this disease when the service is such that the metal is in contact with an active corrosive medium.

The precipitation of carbide between the grain boundaries does not necessarily mean that the disease will develop in all cases. As a matter of fact this phenomenon increases the tensile strength of the metal, and only slightly decreases its ductility and impact value. In many forms of commercial application the materials with which the metal is in contact are not sufficiently corrosive, or sufficiently concentrated to produce the disease, and therefore, in such cases the phenomenon can be disregarded. However, when the service to which the alloy is subjected is known to be highly corrosive, and particularly where experience has indicated that this disease will occur, it is necessary to anneal the welded equipment, or if this is impossible to take advantage of the limited value which a modification of the composition will give.

By suitably modifying the composition of this alloy the dissociation of the austenite will be so retarded that in the short period occupied by the cycle of the welding operation, there will not be sufficient time to permit carbide precipitation to the extent which would produce inter-crystalline corrosion.

Keeping Down the Carbon Not the Cure

IT was logical that the first attempt to modify the composition of this alloy would be to reduce the carbon content. This was done by the Krupp works in Germany, and based on certain laboratory tests it was at first recommended that in order to prevent the occurrence of this disease, especially in welded equipment which could not be annealed after welding, it was simply necessary to keep the carbon content of the alloy below 0.07 per cent. Subsequent laboratory tests and the results of service showed, however, that even with the carbon content below 0.07, this alloy was still susceptible to carbide precipitation if held sufficiently long in the dissociation temperature range, and it was also found that if the chromium and nickel content were low the alloy was as susceptible as if the carbon content were considerably higher with normal percentages of chromium and nickel.

Further research by a number of metallurgists indicated that this phenomenon could only be completely eliminated by reducing the carbon content to less than 0.02 per cent, but when this was done the alloy obviously ceased to be austenitic, and did not have the properties of an alloy of the same composition which was austenitic on account of its high carbon content.

Other modifications were recommended such as the addition of titanium, vanadium, tungsten, columbium, etc., all of which undoubtedly sufficiently retard the dissociation, if the carbon content is kept relatively low, to permit of their safe use for many applications at normal temperatures after welding.

With higher carbon content the addition of practically all of these elements is of doubtful value. It was also found that if the relationship between the carbon and iron content of the alloy is adjusted in a rational manner, the dissociation would be retarded to such an extent that such alloys could be welded safely. Nevertheless all these modifications would ultimately dissociate if heated for sufficient time within the range of 800 to 1500 deg. F., and in most cases the addition of elements other than chromium and nickel to accomplish retardation, have the effect of seriously decreasing the corrosion resistance of the metal.

Adding Columbium Gives Most Promise

WHILE there are a number of elements which if added to this alloy influence the rate of dissociation and perhaps also the form and composition of the constituent which is precipitated between the grain boundaries, it has been the writer's experience that columbium is the only element which apparently accomplishes this purpose without seriously affecting the inherent corrosion resistant qualities of the metal.

It must be borne in mind, however, that all the conclusions which have been arrived at in connection with this phenomenon have been based on the results obtained on a certain specific accelerated test which was introduced by the Krupp laboratories.

(Continued on Page 23)

Speculative Buying in the Metal-Working Industry

Part II of an Original Survey by The Iron Age

CURRENT fears, particularly in official circles, that much of the recent increase in business activity has been due to speculative buying and manufacturing led THE IRON AGE to seek the facts of the situation in the metal-working industry. The first returns from THE IRON AGE canvass were published on July 20 and the remaining findings are presented below.

The survey has disclosed that so far as the metal-working industry is concerned purchases of materials prompted by speculative motives have not been of alarming proportions. While buying has been in larger quantities and further in advance than previously, this has been an inevitable concomitant of extending deliveries. Materials that were obtainable within a few days last spring now require several weeks for shipment.

The quick deliveries available during the acute stages of the depression were a reflection of sub-normal buying, due both to lack of confidence and abnormally small requirements. When business improved, manufacturers found it necessary to extend their purchases of materials to fulfill their contracts without delay.

These purchases, according to THE IRON AGE survey, have not increased faster than manufacturing operations, if reasonable allowance be made for raising stocks of finished parts above "zero" levels. Some expansion of stocks, of course, was essential to permit manufacturers to render the service demanded by customers.

Specifically, 87 per cent of the manufacturers canvassed report that they are not manufacturing for stock greatly in excess of orders. Only 11 per cent of those reporting are buying materials beyond three months' requirements; 32 per cent are buying beyond two months.

The companies making returns report that their dealers are increasing unsold stocks, but only to the extent necessary to take care of heavier demands from their customers. In general, the survey shows that only 16 per cent of the dealers are materially enlarging their stocks. In some cases the dealers are still lagging in their purchases, and have not increased their stocks sufficiently.

Product	Materials Purchases Now Anticipating Orders by:	Materials Purchases Prior to May 1 Anticipated Orders by:	Manufacturing for Stock in Excess of Orders beyond Normal Practice?	Increase in Manufacturing as Compared with Increase in Orders		Are Dealers Increasing Stocks Materially?
				Mfg. Increase	Order Increase	
Springs and Wire Shapes	1 Week	1 Week	No	50%	50%	No
Machine Screws	4 Weeks	2 Weeks	No	....	....	No
Speed Reducers	1 Month	1 Month	No	....	10%	No
Cutting Tools	0	0	No	60%	60%	No
Chucks	3 Months	3 Months	No	25%	25%	No
Transmission Equipment	8 Months	3 Months	Yes	100%	50%	No
Roller Bearings	4 Weeks	2 Weeks	No	....	....	No
Stampings	3 Months	3 Months	Yes	10%	In Excess of Orders	No
Toys	6 Months	4 Months	No	25%	25%	No
Wire Nails	5 Months	3 Months	No	100%	100%	Yes
Miscellaneous Metal Products	6 Months	3 Months	Yes	40%	30%	No
Gears	As Needed	As Needed	No	....	100%	No
Machinists' and Small Tools	2 Months	2 Months	Yes	110%	87%	Yes

Product

Scales
Strip Steel
Automotive Products
Conveyors
Non-ferrous Tubing
Fencing
Machine Tools
Automotive Parts
Transmission Equipment
Printing Presses
Storage Batteries
Valves
Heating Equipment
Small Tools
Jacks
Wire Rope
Electric Controls
Transmission Equipment
Engraving Machines
Steel Shelving
Electric Motors
Chucks
Wire Products
Cap Screws
Bushings
Compressors
Washers
Farm Implements
Machinery
Steel Windows
Pole Line Hardware
Musical Instruments
Brass Goods
Aluminum and Bronze Produc
Furniture Hardware
Plumbers Brass Goods
Washing Machines
Metal Stampings
Casters
Plumbers Brass Goods
Tools
Speed Reducers
Electric Motors
Counting Machines
Hand Tools
Scales
Bolts and Nuts
Wheels
Electrical Appliances
Screw Machine Products
Auto Accessories
Railway Maintenance Equipme
Fruit Packing Machines
Grinding Wheels
Electric Ranges
Electrical Equipment
Engraving Machines
Chucks
Auto Parts
Tools
Dies and Tools
Steel Barrels
Farm Pumps

Product	Materials Purchases Now Anticipating Orders by:	Materials Purchases Prior to May 1 Anticipated Orders by:	Manufacturing for Stock in Excess of Orders beyond Normal Practice?	Increase in Manufacturing as Compared with Increase in Orders	
				Mfg. Increase	Order Increase
Scales	.....	.....	No	40%	40%
Strip Steel	30 Days	15 Days	No	....	....
Automotive Products	3 Months	3 Weeks	Yes	70%	60%
Conveyors	2 Weeks	1 Week	No	....	50%
Non-ferrous Tubing	3 Months	3 Months	No	100%	100%
Fencing	4 Weeks	4 Weeks	No	100%	100%
Machine Tools	3 Months	6 Months	No	....	15%
Automotive Parts	2 Months	1 Month	No	....	20%
Transmission Equipment	2 Weeks	As Needed	No	....	....
Printing Presses	3 Months	3 Months	No	25%	25%
Storage Batteries	4 Months	3 Months	No	....	....
Valves	2 Weeks	1 Week	No	60%	60%
Heating Equipment	2 Months	1 Month	No	....	100%
Small Tools	2 Months	2 Months	No	....	....
Jacks	No Change In Policy		No	....	....
Wire Rope	4 Days	4 Months	No	....	40%
Electric Controls	1 Month	2 Weeks	Yes	10%	5%
Transmission Equipment	6 Weeks	4 Weeks	No	....	....
Engraving Machines	3 Months	3 Weeks	Yes	300%	200%
Steel Shelving	6 Weeks	6 Weeks	No	....	....
Electric Motors	2 Months	1 Month	No	300%	300%
Chucks	No Change In Policy		No	....	....
Wire Products	3 Months	45 Days	No	100%	100%
Cap Screws	1 Month	1 Week	No	....	....
Bushings	3 Months	2 Months	Yes	....	50%
Compressors	4 Weeks	1 Week	Yes	25%	10%
Washers	3 Months	1 Month	No	100%	150%
Farm Implements	3 Weeks	3 Months	No	10%	50%
Machinery	5 Months	2 Months	Yes	....	50%
Steel Windows	2 Weeks	2 Weeks	No	....	....
Pole Line Hardware	2 Months	3 Weeks	Yes	50%	30%
Musical Instruments	30 Days	30 Days	No	....	....
Brass Goods	2 Weeks	1 Week	Yes	....	250%
Aluminum and Bronze Products	1 Month	1 Month	No	....	170%
Furniture Hardware	1 Month	1 Month	No	....	....
Plumbers Brass Goods	1 Month	1 Month	No	....	60%
Washing Machines	3 Months	6 Weeks	No	....	....
Metal Stampings	8 Months	5 Months	No	50%	100%
Casters	2 Weeks	4 Days	No	....	....
Plumbers Brass Goods	3 Months	1 Month	No	....	....
Tools	5 Months	1 Month	No	....	....
Speed Reducers	2 Weeks	2 Weeks	No	....	15%
Electric Motors	0	0	No	....	50%
Counting Machines	2 Months	10 Days	Yes	....	70%
Hand Tools	3 Weeks	1 Week	No	15%	15%
Scales	4 Months	2 Months	Yes	20%	14%
Bolts and Nuts	3 Weeks	4 Days	No	....	100%
Wheels	7 Weeks	3 Weeks	No	35%	35%
Electrical Appliances	6 Months	4 Months	Yes	....	50%
Screw Machine Products	3 Months	3 Months	No	....	....
Auto Accessories	3 Months	2 Months	No	....	....
Railway Maintenance Equipment	2 Months	2 Months	No	10%	10%
Fruit Packing Machines	4 Months	3 Weeks	Yes	....	10%
Grinding Wheels	4 Weeks	4 Weeks	No	....	100%
Electric Ranges	8 Weeks	6 Weeks	No	....	....
Electrical Equipment	1 Month	1 Month	No	....	....
Engraving Machines	3 Months	5 Days	Yes	....	75%
Chucks	3 Months	3 Months	No	....	....
Auto Parts	3 Months	3 Months	No	....	....
Tools	0	0	No	....	15%
Dies and Tools	As Needed	As Needed	No	....	....
Steel Barrels	0	30 Days	No	....	....
Farm Pumps	12 Months	3 Months	No	....	....

Manufacturing as ith Increase in rders		Are Dealers Increasing Stocks Materially?
e	Order Increase	
	40%	....
	....	No
	60%	No
	50%	Yes
	100%	No
	100%	....
	15%	No
	20%	Yes
	....	Yes
	25%	No
	....	No
	60%	No
	100%	No
	....	No
	....	No
	40%	No
	5%	No
	....	No
	200%	No
	....	No
	300%	No
	....	No
	100%	No
	....	No
	50%	Yes
	10%	Yes
	150%	No
	50%	No
	50%	No
	....	No
	30%	Yes
	....	No
	250%	No
	170%	No
	....	No
	60%	No
	....	No
	100%	Yes
	....	No
	....	....
	....	No
	15%	No
	50%	No
	70%	Yes
	15%	Yes
	14%	No
	100%	No
	35%	Yes
	50%	No
	....	No
	....	No
	10%	....
	10%	....
	100%	No
	....	No
	....	No
	75%	No
	....	....
	....	Yes
	15%	....
	....	No
	....	....
	....	No

Product	Materials Purchases Now Anticipating Orders by:	Materials Purchases Prior to May 1 Anticipated Orders by:	Manufacturing for Stock in Excess of Orders beyond Normal Practice?	Increase in Manufacturing as Compared with Increase in Orders		Are Dealers Increasing Stocks Materially?
				Mfg. Increase	Order Increase	
Grinding Machines	10 Days	10 Days	No	....	....	No
Fuses	4 Months	3 Months	No	....	....	Yes
Industrial Trucks	1 Month	1 Week	No	....	....	No
Industrial Trucks	3 Months	1 Month	No	....	....	No
Metal Moldings	0	0	No	....	....	No
Gas Engines	0	1 Month	No	....	....	No
Industrial Furnaces	0	0	No	....	....	....
Wrenches	4 Days	4 Days	No	....	....	No
Motors and Fans	4 Weeks	2 Weeks	No	....	....	No
Sheet Metal Products	3 Months	1 Month	No	....	....	....
Farm Equipment	As Needed	As Needed	No	....	....	No
Garage Equipment	3 Months	45 Days	No	....	....	No
Mining Machinery	1 Month	1 Month	No	....	....	No
Strip Steel	6 Weeks	4 Weeks	No	....	....	No
Structural Steel	3 Months	1 Month	No	....	....	Yes
Sheets and Plates	3 Months	2 Months	No	....	....	Yes
Ovens	1 Month	1 Month	No	....	....	No
Road Machinery	2 Months	1 Month	No	....	....	No
Small Tools	3 Months	3 Months	No	....	....	No
Portable Air Tools	10 Days	10 Days	No	....	....	No
Bushings	6 Months	2 Months	No	....	....	No
Wire Rope	3 Months	1 Month	No	....	....	No
Steering Gears	0	0	No	....	....	....
Transmission Equipment	6 Days	6 Days	No	....	....	No
Kitchen Utensils	3 Months	1 Month	No	....	....	Yes
Agricultural Implements	4 Weeks	4 Weeks	No	....	....	No
Scales	0	0	No	....	....	No
Nickel Silver	4 Months	2 Months	No	....	....	No
Aluminum Alloys	0	0	No	....	....	No
Tools and Machinery	6 Months	2 Months	Yes	....	....	Yes
Hydraulic Transmissions	3 Months	2 Weeks	Yes	90%	50%	No
Bolts	10 Days	10 Days	No	....	....	No
Screws	3 Weeks	6 Days	No	....	....	No
Tool Steel	4 Weeks	2 Weeks	No	....	....	No
Bearings	2 Months	1 Month	No	....	....	No
Springs	3 Weeks	3 Weeks	No	....	....	No
Cap Screws	3 Weeks	1 Week	No	....	....	Yes
Screws	2 Months	2 Months	No	....	....	Yes
Screws and Bolts	4 Weeks	2 Weeks	No	....	....	Yes
Wire Products	2 Months	2 Months	No	....	....	No
Pumps	1 Month	1 Month	Yes	....	....	No
Wire Forms	2 Months	1 Month	No	....	....	No
Saws	2 Months	1 Day	No	....	....	Yes
Hardware	0	0	No	....	....	No
Machine Tools	Buying Only Against Orders		No	....	....	....
Wire Goods	We Are Not Speculating		No	....	....	No
Tools	6 Months	3 Months	No	....	100%	No
Clutches	0	0	No	....	250%	No
Farm Tools	4 Months	2 Months	No	....	....	No
Warehouse Trucks	0	0	No	....	....	No
Baling Presses	3 Months	20 Days	No	....	75%	No
Bolts and Nuts	2 Months	1 Month	No	200%	250%	Yes
Flexible Shaft Equipment	4 Weeks	10 Days	Yes	....	40%	No
Special Machinery	10 Days	10 Days	No	70%	70%	No
Hardware	3 Months	1 Month	No	25%	25%	No
Power Transmission Machinery	6 Weeks	6 Weeks	No	....	....	No
Electrical Apparatus	2 Months	1 Month	No	....	75%	No
Screw Machine Products	1 Week	3 Days	No	....	50%	No

(Continued from Page 18)

This consists in boiling the alloy, which has been heated for various time periods at some temperature within the range of dissociation, in a solution containing 10 per cent sulphuric acid and 10 per cent copper sulphate. Under this test alloys which have been subjected to temperatures of dissociation will either completely disintegrate in a short period of time, or lose their metallic ring, or be unaffected depending on the composition and time of heating.

Questions Value of Krupp Test

IT seems to the writer that one is not justified in accepting the results of this test as a measure of what may happen in actual service, especially since it can be readily shown that samples which are unaffected by this particular solution will be seriously affected by other accelerated tests, such as boiling in concentrated nitric acid. It can also be shown that even the most stable alloys having an extremely low carbon content and those alloys with columbium and titanium which have given the best results, as measured by the sulphuric copper-sulphate test, will, when welded, show a distinct line of weakness at the area next to the weld if they are subjected to certain selective corrosive influences, such as ferric chloride, and certain combinations of mixed acids.

It would appear, therefore, that in spite of the results obtained by this generally accepted accelerated test adopted by the Krupp laboratories, "incipient" dissociation does take place when even the most stable alloy is welded and can be detected by the use of some other method of testing, even though the presence of precipitated carbide cannot be established by the usual microscopic examination for this constituent.

Suggests Electrolytic Action With Variable Potential Differences

A CAREFUL study of the manifestations of this particular accelerated test will reveal the fact that the results of the tests are entirely due to electrolytic action brought about by differences of potential, and also that the results can be varied measurably by slight modifications in concentration, or by changes in the composition and structure of the alloy tested.

For example, if high carbon 18-8 alloy is heated to 1200 deg. F. for a short time and then subjected to this test, it will disintegrate very rapidly. If the same alloy is heated to 1550 deg. F. for a short time and subjected to this solution, it is unaffected. Microscopic examination of the two samples, however, will show that the one that has been heated to the higher temperature contains a much greater amount of precipitated carbide than the one which has been heated to the lower temperature.

Similarly if we prolong the time of

heating at 1200 deg. F. to 400 to 500 hr. instead of a few hours the sample may only be slightly affected by this accelerated test and in many cases may not be affected at all. Yet the microscope will show a much greater amount of precipitated carbide in the sample which has been heated for a long time than the one which has been heated for a short time.

It is apparent that under different conditions of heating, the precipitated constituent assumes modifications which changes its electric potential, and a corresponding change is obtained in the results in this particular electrolyte: boiling sulphuric acid and copper sulphate. It does not necessarily follow, however, that the same results will be obtained if some other electrolyte were used, as can be readily shown, nor does it prove to a logical mind that the same results will be obtained when the metal is used for some other purpose.

As an example, it is well known that when cyanide solutions are used, the difference in potential between certain metals is not the same as when sulphate solutions are used, and in fact, the position of certain metals in this electric-chemical series is changed when the series is determined by the use of other electrolytes. Use is made of this fact in the separation, by electrolysis of various metals in solution; by the use of certain electrolytes, the potential between different metals can be brought close enough together so that the metals will deposit simultaneously.

Krupp Reagent Not Indicator of Action of Beer

AGAIN in the electroplating of copper on steel or iron, the difference in potential between the copper and the steel or iron is so great that a loose, coarse deposit is obtained that is valueless as a plate. Cyanide solutions are invariably used to plate copper on iron or steel because the difference in potential is much less than in sulphate solutions and a fine adherent deposit is obtained. One cannot expect to find that the corrosive influence of beer would be parallel to that of the so-called Krupp reagent, and therefore, why should one use the results obtained by this reagent to forecast what will happen to a welded beer barrel?

An amusing incident recently occurred to the writer which illustrates this point. A "high powered" tire salesman in his effort to sell a particular brand of tire demonstrated that the fiber which was woven in his tire when immersed in a concentrated sulphuric acid was not effected, while the fiber in his competitor's tire was destroyed. This appeared to him a very convincing reason for purchasing his tire, and he became very indignant when the writer pointed out that he was not in the habit of driving his automobile through a stream of sulphuric acid, and therefore, could see no advantage in purchasing that particular brand of tire, unless this property of the fiber would be reflected in better service.

It must therefore, be recognized that the results of this particular accelerated corrosion test can only be used as a relative indication of the extent to which a change has occurred in the structure of the alloy, which may or may not affect its ultimate value in service, and the results must only be considered from a standpoint of relativity. It might be said that by this test one is able to measure certain changes of high magnitude in the structure of the metal, brought about by time and temperature, but one is not able to measure changes of low magnitude which are brought about by the same condition. The change which occurs by heating this alloy at a temperature of 1200 deg. F. for a relatively short time, say one hour, is, as measured by this test, apparently of a much higher magnitude than the change which occurs when the alloy is heated to the same temperature for a period of 1000 hr.

Contradictory Findings of the Krupp Test

IT really does not matter what theory we adopt to explain the difference that exists, the fact remains that this test will identify the change which has occurred in one case, and fail to identify it in the other. If therefore, the service to which the alloy is to be put involves prolonged heating within the range of dissociation one is not warranted in using the results of this test to forecast what will happen in service, even if the conditions are almost identical, because as shown above the results of this particular test are contradictory under varied conditions of time and temperature. It would be still more ridiculous to accept the results of this test as indicative of what will happen in service which involves corrosive influences which are not analogous to that of the sulphuric-acid-copper-sulphate solution.

Modern methods of electric welding, such as line or high-speed continuous spot welding under water

(Concluded on Page 66)

Oil Painting in Vitreous Enamel

VISITORS at the Century of Progress Exposition, Chicago, familiar with the methods and technique of vitreous enameling, are amazed at this unique exhibit of Republic Steel Corpn., Youngstown, Ohio, in the "porcelain enamel parade." The exhibit is composed entirely of porcelain enamel fused on "Toncan" enameling iron, trimmed with sparkling "Enduro" stainless steel. It is chair-like in shape with porcelain enamel tile forming the floor and riser, and a single sheet, 54 in. x 60 in., acting as the back wall. Upon this sheet is a large reproduction of an oil painting representing a Republic ore boat being unloaded at a Great Lakes ore dock, executed entirely in porcelain enamel in 32 distinct colors—a feat which any enameler will readily appreciate.

The artist in ceramic colors must know exactly what shade his enamel will assume after firing to be able to predict the final effect. Realizing this, the problems of the artist in enamels can be seen to be exceedingly complex.

The picture was executed by Ceramic Color & Chemical Mfg. Co., New Brighton, Pa., in collaboration with Ingram-Richardson Mfg. Co., Beaver Falls, Pa. All of the 32 different colors used were applied with an ordinary writing pen, since brushes or stencils cannot be used. It was necessary to apply about eight to ten different colors and then burn the sheet at 1550 deg. F. for approximately three minutes in the enameling furnace. After this burning 10 or 12 additional colors were applied and the sheet burned again in the same manner.

Shading of the different parts of the picture was then done, after which another firing was required. After the shading and subsequent burnings the picture was subjected to retouching all over to obtain the particularly delicate hues of the original oil painting. Another firing was given the sheet after the retouching. The picture received ten burnings in the furnace in addition to the test firing. Following is the order in which various enamels were applied and burned:

1. Grip or ground coat applied all over and burned.
2. White coat applied all over and burned.
3. Black background applied all over except for the space occupied by the picture and burned.
4. Light blue enamel on picture background applied and burned.
5. Green enamel coat for name and trademark applied and burned.
6. Black enamel applied all over except space for picture, name and trademark, and again burned.
7. Ten different colored enamels for picture applied and burned.
8. Twelve different colored enamels applied and burned.
9. Ten different colored enamels shaded on picture and burned.
10. Various shades applied as retouching followed by burning.

The small tile forming the floor and riser are the product of Youngstown Pressed Steel Co., Warren, Ohio. The floor is done in white with the Toncan enameling iron trade-mark and border in green. The riser is green and supports a giant replica of a Republic letterhead bearing a message from N. J. Clarke, vice-president in charge of sales. The letter is a product of "Ing-Rich." Highly polished Enduro Stainless Steel trim completes the striking effect.

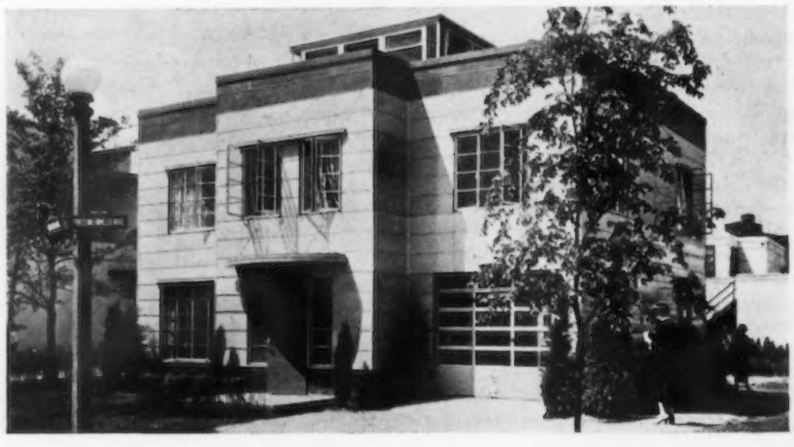
Porcelain Enameled All-Steel House

THIS modern porcelain enameled all-steel house has recently been completed at "A Century of Progress" for American Rolling Mill Co., of Middletown, Ohio, and the Ferro Enamel Corpn., of Cleveland. The Insulated Steel Construction Co., of Cleveland, built the house, using its newly developed patented frameless steel construction, which makes possible rapid field erection and economical building costs.

The home is fire resistant, vermin-proof and heavily insulated. It is highly wind-resistant, lightning safe, and economical to maintain.

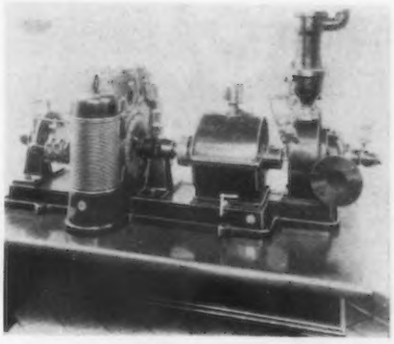
The coral shaded porcelain enamel exterior is so durable and permanent that the house will never need painting. Grooved strips of stainless steel hold the enameled siding in place.

The house contains seven large rooms, including living room, dining room, kitchen, garage, laundry and heater room, four bedrooms, two sun-decks and solarium. Representing a most modern architectural conception in low-cost homes, the price in commercial production is within the $5,000 range.



First Commercial Steam Turbine in the United States

AT the Century of Progress Exposition in Chicago the Central Station Industry has an exhibit showing the development of prime movers and consisting largely of models of early and recent engines and turbines. One of the machines is a De Laval geared steam turbine driving a direct current generator which was actually used to supply current at the Columbian World's Fair at Chicago in 1893, and is believed to have been the first steam turbine generator unit placed in commercial service in the United States. The turbine, which is of the single stage, impulse type, ran at 24,000 r.p.m. and drove the 110 volt direct current generator at 2400 r.p.m. by means of a De Laval double helical speed reducing gear, developing 6.6 KW. The turbine wheel is mounted



upon a flexible shaft, a device invented by De Laval some years previously.

Steam was expanded from 125 lb. gage pressure to atmospheric pressure through diverging or flaring nozzles, which had been invented by De Laval in 1888 and which are now employed by practically all turbine builders. That the theory of such nozzles was far from obvious, however, is shown by the fact that when De Laval applied for a United States patent in 1889 he was met with the objection from the Patent Office that the idea was not workable, and it was only after the machine at Chicago had been exhibited in actual operation that the office was convinced and the patent allowed.

A similar De Laval turbo-generator, which was built for locomotive headlight service in about the year 1903, has been split longitudinally and is also shown in the Central Station Industry exhibit. It is rated at 1½ hp. and was designed to receive steam at 200 lb. gage pressure and to exhaust to atmosphere. The turbine wheel ran at 39,000 r.p.m., which was reduced by a double helical gear to 5000 r.p.m. for the generator.

REPUBLIC products are featured in the Good Housekeeping-Stran Steel House at the exposition, the entire exterior being scrubable cream-colored porcelain enamel fused on "Toncan" iron. The enameled iron is backed with "Haydite" and cork concrete to form "Glasiron Macotta," a product of Maul Macotta Corpn., Detroit. Glasiron units are easily put in place much like stone or brick, forming an extremely substantial wall. The enamel used is of the stainless variety, a product of Porcelain Enamel & Manufacturing Co., Baltimore. The units are edged with "Enduro" stainless steel to guard against corrosion at the joints.

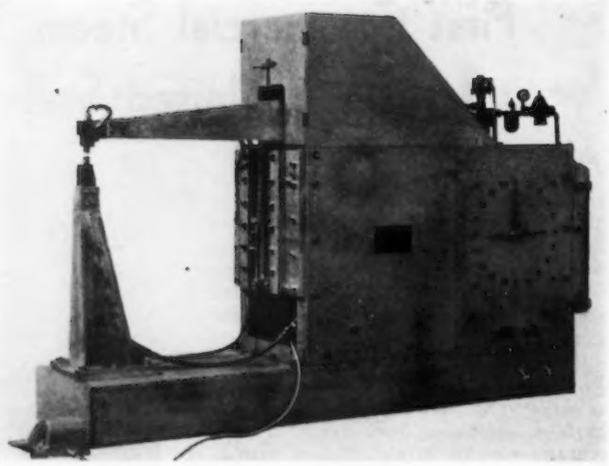
This model house has attracted the attention of visitors, both architects and homeowners, because of the large number of features endowing it with charm, utility and economy.

PART of the Porcelain Enamel Parade, a cooperative exhibit at Century of Progress, sponsored by the Porcelain Enamel Institute.

The parade is 200 ft. in length, and contains 44 individual exhibits.

THE progress made in providing comfort for the American home is portrayed in the "Garden of Comfort" of American Radiator & Standard Sanitary Corpn. at A Century of Progress, Chicago. The entrance to the garden is shown here. In the background is the "Home of Artificial Weather," where an array of indoor weather manufacturing products for practically everything that comes under the classification of shelter is being presented. A large cooling plant holds the temperature in this building well below outside temperatures and thousands sought relief here during Chicago's recent heat waves.

Resistance Welding Machine Built Largely of Aluminum



CHOKING or retarding effect on the welding transformer is reduced by the use of aluminum.

THE resistance welding machine illustrated, built recently by the Federal Machine & Welder Co., Warren, Ohio, is made entirely of aluminum except such small parts as cap screws, bolts, etc., and the copper alloy electrodes and secondary castings in the transformer. Standard structural shapes such as channels, angles and tees, fabricated and welded together, were employed. The large front plate and base, and the arm are of Alclad aluminum alloy and the greater part of the machine is built of heat-treated aluminum with a 5 per cent deposit of pure aluminum on the outside for conductivity. This welder was built for the Aluminum Co. of America for welding non-ferrous metals of various thicknesses. The first one is being used at a United States Naval base in constructing airplane wings.

It is stated that one of the reasons for building the machine of aluminum was that use of this metal eliminates to a considerable extent the choking or retarding effect on the welding transformer that occurs when a welding machine is built of ferrous metal. Welders made from cast iron and steel have a certain deterrent effect on the welding transformer due to the ferrous metal acting as a choke in the magnetic field. With welded construction no patterns or castings were required, and lightness was secured by the use of aluminum.

The transformer is of special design with from 0.5 to 12.4 secondary voltage in 20 equal steps of 0.6 secondary volts each. The lower welding arm is designed so that it can be attached to the base of the machine for deep throat work up to 36 in. or attached to the front of the machine for underslung work. The machine is equipped with a special General Electric thyratron tube control by which the alternating current flowing through the welded material can be regulated to within ½ cycle.

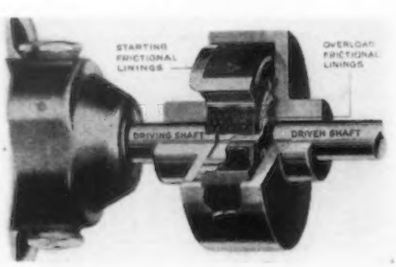
The mechanical operation of the machine is by means of a 7-in. diameter air cylinder control with a mechanically-operated foot switch timed and synchronized with the thyratron control by means of solenoids. Pressure may be regulated from practically nothing to the maximum of the air supply line. The surge on the operating cylinder is smoothed out by means of an auxiliary storage tank built into the machine. Speeds, welding current and pressure can be conveniently and accurately varied from maximum to minimum to govern all welding conditions. The machine is 25 in. wide, 74 in. high, and 103 in. long, overall. The distance from floor to welding points is 48 in. Equipped with a 200 kva. transformer, the machine weighs 3950 lb.

Economies Claimed for Four-Duty Coupling

THE Falk Corpn., Milwaukee, has added to its line of general transmission equipment the Falk-Rawson "4-Duty" coupling illustrated, which, it is stated, performs four important duties, namely, starts, couples, cushions and limits the load.

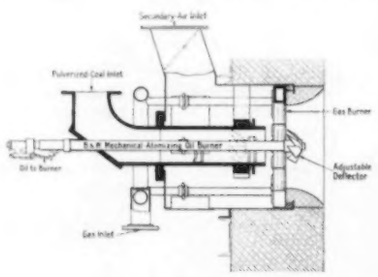
Savings in electrical equipment—motors and controls—are claimed. The device protects the machine or the product being made by affording smooth, gradual starting and cushioning of overloads. It is stated that by reducing inrush of current and permitting the selection of smaller motors operating closer to their maximum capacities, the device frequently lowers electrical bills. In addition it eliminates the need of shear pin couplings and fulfills the functions of a flexible coupling.

The primary duty of this coupling is as an automatic starter, centrifugally operated, which function it accomplishes in a simple manner. Essentially the construction consists merely of two drum-shaped members, one attached to the driving shaft and the other to the driven shaft. Between the driving and driven members are inserted two sets of floating segments, made usually of brake lining reinforced with lead, the amount of lead being calculated to give the required centrifugal pressure for carrying the load. The outer segments are actuated by the driving member and the inner by the driven member. The two are said to give just the right combination of smooth starting and overload protection.



Burner Uses Liquid, Gaseous or Solid Fuels

THE "Multifuels" burner illustrated, a new product of the Babcock & Wilcox Co., 85 Liberty Street, New York City, is adapted to combination firing through refractory burner-walls and is consequently suited to small and moderate size industrial boiler units. The burner, which is of the horizontal turbulent type, combines the features of the company's circular and mechanical atomizing oil burners, together with additions necessary for the efficient burning of gas.



Liquid, gaseous, or solid fuels in pulverized form may be injected into the furnace through a common circular throat opening, either one at a time, or in combination. The adjustable deflector, mounted at the furnace end of the primary-air and pulverized-coal pipe, assures intimate mixing with the secondary air and furnishes a high degree of turbulence.

Automatic Timer for Resistance Welders

FOR use in connection with resistance welding machines the Electric Controller & Mfg. Co., Cleveland, is offering the automatic weld timer illustrated, which, instead of providing a definite amount of time for each weld, varies the time automatically in inverse proportion to the rate of current flow. Installed and adjusted for the range of work at hand, the device is claimed to assure uniformly sound welds irrespective of variations in voltage, condition of electrodes, thickness of material, or amount of scale, rust or dirt.

Initial adjustment of the timer is easily made by welding a few scrap pieces of work to be done, then tearing these welds apart for inspection. When the weld desired is obtained, the cabinet door may be locked. It is stated that for all practical purposes within reasonable limits it will not be necessary to readjust the timer; for the exceptional case, however, the adjusting dial on the weld timer can be changed to suit the particular condition.

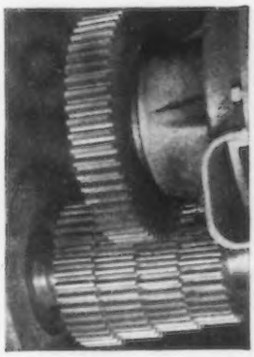
The standard type of automatic weld timer consists of a rectifier tube which charges a fixed condenser in proportion to the rate of current flowing in the welding circuit. When the charge reaches an amount sufficient to pass current through two neon gas-filled tubes, a small relay operates; this, in turn, opens the relay controlling the main line contactor. The tubes are in the circuit only when the welding current is on so that as soon as the main welding circuit is opened, the weld timer is ready for the next operation.

Various other forms of weld timers can be supplied. One is the automatic repeat type which has an additional timing element to govern the length of time the electrodes are apart. Another, known as the non-beatable type, is furnished where it is desired to prevent the operator from separating the electrodes from the work before the welding current has been interrupted.

Variable-Speed Buffer, Polisher and Grinder

SELECTIVE gear drive of simple design features the new variable-speed buffer, polisher and grinder placed on the market by the United States Electrical Tool Co., Cincinnati. With this drive efficient peripheral speeds can be maintained for any desired diameter of wheel, and being positive in action, the drive is emphasized as eliminating slippage, thus reducing power costs. The gear drive provides four wheel speeds, from 2000 to 3000 r.p.m., or any other range desired. Speeds may be changed quickly by means of the lever mounted on the front of the machine.

The machine is obtainable also as a grinder, designated as the models 64 and 65, for heavy, continuous work. In this case the selective speed gears are interlocked with the speed lever in such a manner as to make it impossible to run the wheels at a dangerous rate of speed. The guards of this grinder are adjustable for various wheel diameters.

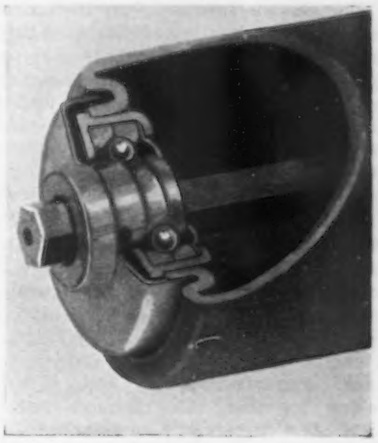


The four-speed selective gear drive permits maintaining efficient peripheral speeds for various diameter wheels

Gravity Roller and Bearing Combination

A GRAVITY roller with ends formed in one piece to receive the bearing has been brought out by the Standard Conveyor Co., North St. Paul, Minn. This construction, it is stated, makes a stronger and truer running combination.

A recess is formed in the end of the roller to receive a stationary dust shield fastened on the inner ball race. An inner steel shield is also made part of the bearing, fitting closely against the inner race to retain the grease. A hexagon axle prevents the inner race from turning, and a corresponding shaped hole in the side rails makes a positive lock.



This combination is furnished packed with grease, and for extremely wet and dusty conditions, the end of the shaft is drilled for regreasing or flushing of the bearing. The outer end of the bearing cone is counterbored so the grease can go completely around the shaft and through holes in the cone into the space allowed in the bearing and between the bearing and the shields.

A STEAM-ATOMIZING burner designed to handle fuels such as heavy oil, tar, pitch and cold sludge, has been brought out by the Babcock & Wilcox Co., 85 Liberty Street, New York. Steam is admitted to the annular space around a central fuel barrel and is projected across each outgoing stream at the nozzle plate. This, it is stated, effects complete atomization and results in a short turbulent flame when used with the standard B. & W. burner register.

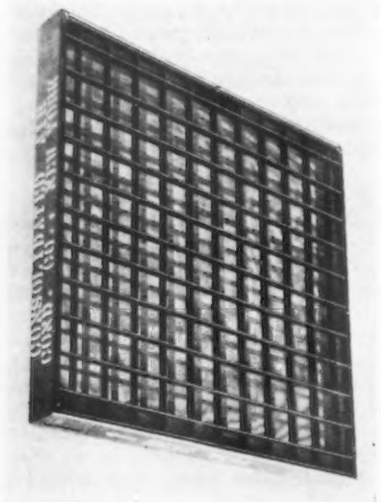
Odor Filter Applicable to Industrial Systems

VIRTUALLY all odor-creating organic and inorganic gases and vapors, including gasoline, benzol, alcohols, turpentine, sulphurdioxide, etc., are said to be extracted from the air by the odor filter illustrated, which is being offered by the Consolidated Air Conditioning Co., 942 Chrysler Building, New York.

In industrial systems an important use of the filter is to prevent contamination of products which might be rendered useless by extraneous odors. The device may be used also for removing odors from air discharged from plants employing odor-creating processes, thus preventing pollution of the surrounding air. Paint spray booths come within the latter class of applications. In ventilating and air conditioning systems, the filter will remove odors from recirculated air, and it may be used in special systems involving odor disposal.

The device functions on the same principle as the United States Army gas mask. Contaminated air is passed through a bed of granular activated coconut shell carbon, which absorbs and holds all condensable gases and vapors. When the carbon has reached the limit of its adsorptive capacity, it is simply reactivated.

The filter is of simple construction. The basic element is the unit cell illustrated, the number of which for any particular installation depends upon the volume of air to be handled. The cells are mounted in an iron cabinet. The unit cell is made of a black iron framework and grids, welded together. A 22-mesh rustproof steel wire cloth is mounted on the inside of each grid for retaining the carbon, which is introduced through the filling door at the top of the cell. Cells measure 20 x 20 in. x 2¼ in., and weight when filled, about 29 lb. The thickness of the carbon bed is 1 in. Air handling capacity per cell is 125 cu. ft. per min. at a face velocity of 54 ft. per min. The standard cabinet holds four cells; it measures 20¼ x 23 x 23 in. and weighs, with the four cells, about 176 lb.



Tungsten-Carbide Tool Lapping Machine

THE Porter-Cable Machine Co., Syracuse, N. Y., has placed on the market a new machine for lapping tungsten-carbide tools. It is furnished with or without the sliding tool carriage, the latter for free-hand lapping.

Base, pedestal and housing are of substantial cast-iron construction. The machine is well balanced and bolting to the floor is unnecessary, although provision is made for bolting if desired. The cast-iron disk, which is 15 in. in diameter, is carefully balanced after machining and is supported by an oversize thrust bearing built into the motor. A copper disk can be furnished special. The disks are controlled by a two-pole switch mounted on the motor. The distance from the disk to the floor is 39 in. Overall dimensions are 22 x 50 in., and the net weight of the machine equipped with adjustable tool carriage is 275 lb. Equipment includes a superimposed 7-in. diameter wood burnishing disk and a ½-hp. ball bearing motor.

It is stated that in general the lapping on the cast-iron or copper disk with Carborundum Brand finishing compound, grading R40 fine, is sufficient to produce a sharp edge and eliminate all chips and grinding marks. If a finer finish is required the same compound may be used on the wooden disk. This compound leaves a dull mat finish from the cast-iron lap and a semi-polish finish from the wooden lap. The wooden disk of white wood or mahogany is approximately one-half the diameter of the cast-iron disk on which it is mounted. The object of the wooden disk is to provide a softer lap for finishing, and by the use of this combination disk, a faster cutting compound can be used in the first operation. When using the Carborundum finishing compound, charging of the lapping disk is not necessary.

Other tools requiring a keen cutting edge, also gages and other parts can be lapped on the machine. With an abrasive disk cemented to the cast-iron disk, the machine may be used for removing burrs and for free-hand grinding after milling and other machine tool operations.

Light-Duty Ball-Bearing Electric Drill

THE new light-duty ¼-in. electric drill recently brought out by the Independent Pneumatic Tool Co., 600 West Jackson Boulevard, Chicago, has ball bearings on both ends of the armature and is equipped with hand wound and formed coils. The motor is built with each coil insulated three times with silk wrapping. The commutator is a separate unit, built upon a brass sleeve that expands and contracts evenly with the copper segments, so that the segments will not work loose and rise. A dust-proof toggle switch is located just inside the handle. The tool weighs only 5 lb. and measures 11¼ in. in length, overall. It runs at a speed of 2200 r.p.m.

Tuthill Spring Co., 760 Polk Street, Chicago, has appointed S. C. Ewing & Co., Nashville Trust Building, Nashville, Tenn., representative in Kentucky and Tennessee for its highway guard, and Oscar Winter, Southwest Bolt & Nut Co., 1228 Hadley Avenue, St. Louis, representative for the same product in Missouri.

Wheeling Enters Steel House Field

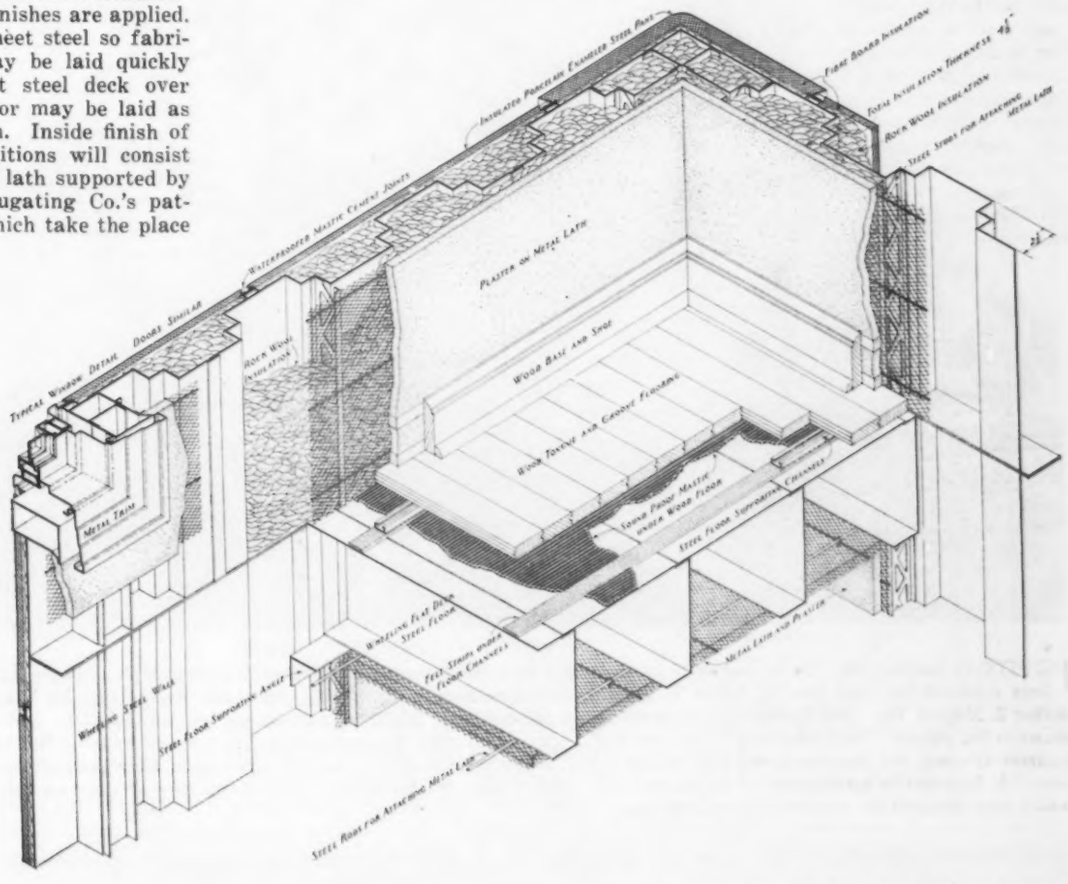
A NEW type of steel house embodying pre-fabricated principles has been announced by the Wheeling Corrugating Co., subsidiary of the Wheeling Steel Corpn., Wheeling, W. Va. Realizing that by fabricating sheet steel into definite forms, greater speed of production and quicker assembly of parts could be accomplished and greater impetus given to the advancement of the steel house, this newest entry into the field is the result of two years of engineering by the Wheeling company with the cooperation of Charles Bacon Rowley & Associates, Inc., architects, Cleveland. The accompanying design for the first house, which will be erected on an appropriate site in Wheeling, is simple in construction and architecturally correct. Into its construction, which will be undertaken forthwith, will go pre-fabricated units including newly perfected steel wall and floor sections, to achieve what is considered a new standard of efficiency in fireproof construction at reasonable cost.

The foundation walls and footings of the Wheeling house will be of customary masonry type. The basement will be under part of the structure but the design is such that the basement may be eliminated without in any way altering the general arrangement and plan of the residence. Fabricated sheet steel walls will be firmly fastened to a sill plate by welding and the sill plate will be anchored to the masonry. The sheet steel walls not only serve as structural members but provide a base or ground to which the outside and inside finishes are applied. Floors will be of sheet steel so fabricated that they may be laid quickly and produce a flat steel deck over which a wooden floor may be laid as the final floor finish. Inside finish of the walls and partitions will consist of plaster on metal lath supported by the Wheeling Corrugating Co.'s patented steel studs which take the place of the customary 2 x 4-in. timbers. Ceilings will be plastered on metal lath secured to the underside of the steel floor sections.

The outside surface of the residence will consist of steel sections, or plates, ½ in. deep, which will be coated with porcelain enamel and then filled with a fibrous insulation. Joints between the plates will be pointed with an elastic cement colored to blend with the porcelain enamel. The porcelain enamel, which will be applied by the United States Stamping Co., is a glass coating of acid-resisting qualities, and is available in any number of colors and finishes in a variety of textures. Careful consideration was given to the color scheme for the first residence and as a result the main body will be a medium, warm gray with certain panels shaded for decorative purposes. Pilasters are a dark, blue-gray and will project approximately ½ in. beyond the face of the wall to emphasize stability and to lend a desirable contrast in shadow. The reveals in the cornice will be a dark red, and the steel window subframes will be a gray-green with the sash painted white. It will be noted in the perspective that tubular steel trellises both in front and in the rear of the residence will lend a pleasing touch and offer opportunity to the tenant to frame entrances with vines.

Windows will be of heavy section steel, casement type, with copper screens covering the entire opening and so arranged that the window may be opened or closed without disturbing the screens. All doors will be of flush 1¾ in. type of wood and the baseboards will be of wood for an enamel finish. Door frames, window frames and trim will be of steel and decorated with enamel to harmonize with the woodwork.

A feature of construction is the insulation against heat and cold. Due to the construction of the sheet steel walls mineral or rock wool will be securely packed 4 in. thick to fill all voids. This wool will extend also over the ceilings directly under the roof and has been found to have an insulating value greater than would be attained with an 18-in. masonry wall.


Typical Window Detail
Doors Similar
Waterproofed Mastic Cement Joints
Insulated Porcelain Enameled Steel Plate
Fibre Board Insulation
Total Insulation Thickness 4½"
Rock Wool Insulation
Steel Studs for Attaching Metal Lath
Plaster on Metal Lath
Wood Base and Strip
Wood Tongue and Groove Flooring
Rock Wool Insulation
Metal Trim
Mastic under Wood Floor
Steel Floor Supporting Channels
Wheeling Flat Deck Steel Floor
Steel Studs under Floor Channels
Wheeling Steel Wall
Steel Floor Supporting Angle
Metal Lath and Plaster
Steel Base for Attaching Metal Lath

THE Wheeling steel house includes sheet steel walls with porcelain enamel outside finish, steel plate cores for the floors and in general a maximum of pre-fabrication that is calculated to make mass production of the materials practicable

All outside doors will be weather-stripped, and the hot water radiators will be suspended from the wall to give proper access for cleaning and eliminating dirt pockets under the radiators. Wiring will be in steel conduit with provision made for an electric range in the kitchen. In keeping with modern requirements, radio outlets and base plugs for electric refrigerator and other appurtenances will be properly placed.

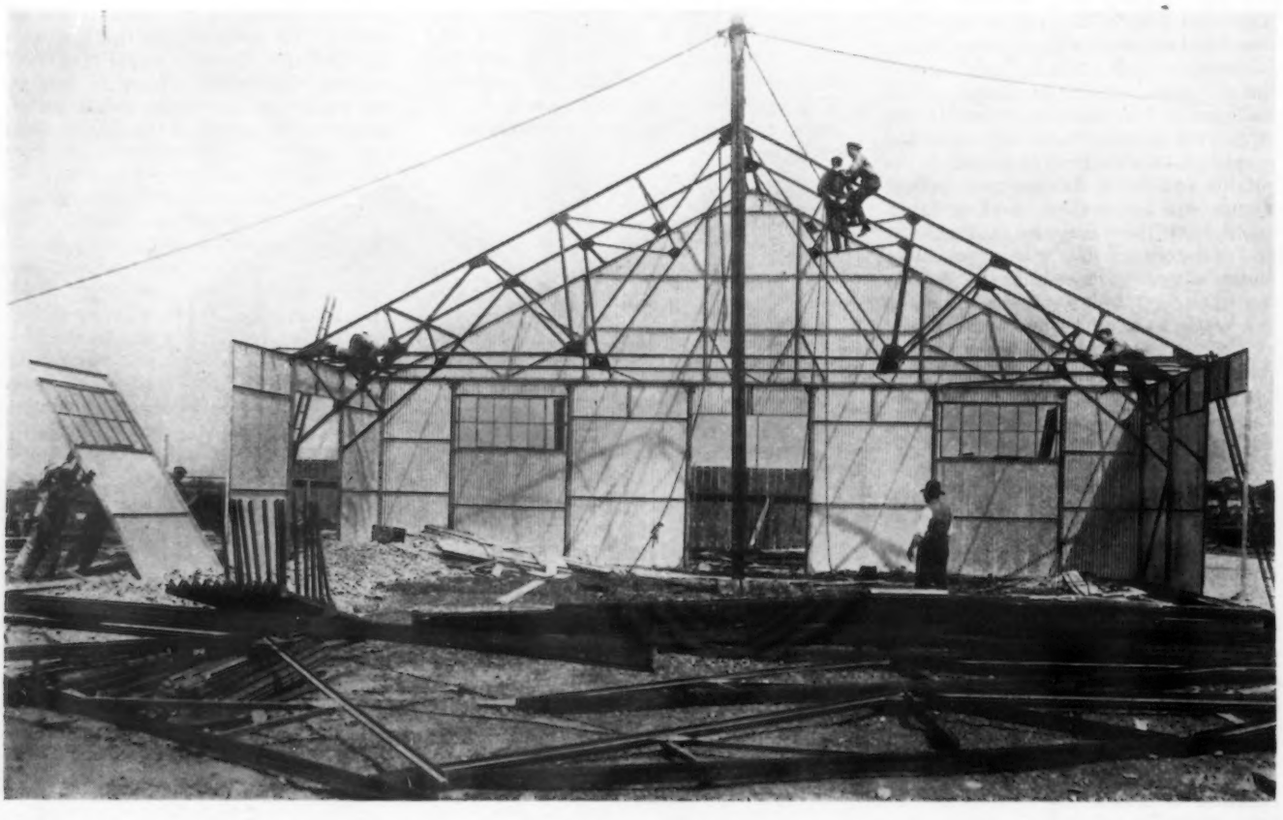
Entrance of the Wheeling Corrugating Co. into the field of steel house construction and marketing follows 40 years' experience in the production of sheet steel building materials, including metal lath and plastering accessories, roofing, etc. Either the Corrugating company or other divisions of the Wheeling Steel Corpn., the parent company, manufactures practically every building product required for this new steel house construction, including pipe for plumbing, conduit, etc. It is anticipated that the outcome of the construction of the first residence will demonstrate the practicability of mass production of all materials, protected by patent applications, and that the units will lend themselves in a general way to the construction of a large variety of buildings and permit flexibility of design. While the first residence, as shown in the illustration, will be constructed with a flat roof and pent house solarium, the system will permit pitch roof construction when desired.

Steel-Cored Veneers for Building Trim

Laminated resin, which is made by superimposing layers of resin-impregnated fabric or paper and combining them, under the simultaneous application of heat and pressure, into a dense solid homogeneous sheet, may now be supplied with a steel core or backing. As the result of investigations at the Mellon Institute of Industrial Research, Pittsburgh, the Robertson bonded-metal of the H. H. Robertson Co., has been adapted to this new use.

The R-B-M is a fiber coated metal with a surface that provides anchorage for an adhesive and requires only one pressing operation to produce a finished veneered panel, with a bond between fabric and steel that is found to be 45 per cent stronger than possible by present methods of attachment to etched steel. According to the Mellon Institute report, copy of which may be had on request, the steel panels veneered in the way outlined present attractive surfaces of colored and printed fibrous layers. The economy of the combination is that the metal core supplies desired strength with only thin veneer layers for the decorative effects. Building construction appears to offer the main field of use.

Knock-Down Construction for Plant Buildings



INDUSTRIAL buildings that can be erected by inexperienced labor, for example by employees of a company requiring the additional structures, have been marketed for some time by Arthur B. Shepard, 1060 Park Avenue, New York, who is now incorporating his business under the name of Arthur B. Shepard, Inc. One feature of the construction is the wall unit, fabricated with siding and sash complete, and swung into position as shown in the picture. The frame work of the unit is of angles, which make it a simple matter to bolt unit to unit. The combined angles serve as columns to carry the shop-fabricated roof trusses. The Shepard buildings have been knocked down after years of use and reerected at other sites. A departure in construction is made where the building must withstand gales, as was the case of some recently shipped to Venezuela which were designed for winds of 100 miles an hour.

What Industry Thinks of Industry Control

"Failure of Washington to Clear Up Uncertainties" Says L. M. Rossi, "Is Real Cause for Delay in Industrial Recovery Program"

By L. M. ROSSI
Vice-President, Bakelite Corpn.

L. M. ROSSI

WHATEVER industrialists may think of the National Recovery Act I believe that they are quite as much concerned over delays in getting it into operation as are the Washington authorities. The act has occupied the exclusive attention of business leaders for four weeks or more and in the meantime their own plans have either been delayed or held in abeyance.

There can be no question but that the great majority of industrialists recognize that this legislation opens up an opportunity to correct abuses of which they have long been aware. The purpose of the act, to put men back to work at fair and livable wages, has had the support of every right thinking man. Speaking from the vantage point of an industry which supplies a raw material that finds its way into practically every other industry, a circumstance which forced me to keep in touch with numerous trade associations, I can state without reserve that industrialists have shown no unwillingness and little hesitation to cooperate with Washington, daily papers notwithstanding.

They do feel, however, that they have been forced to walk in the dark because of lack of specific information. No sane man expects that the hastily constructed organization for administering the act can answer the detailed questions which are on the tongue of every industry. But most business men feel that Washington has procrastinated unnecessarily in recognizing the true cause for delays in codification and the pressing need for straightforward answers to a few major questions of common concern to all industries.

The Issues in Doubt

THE doubtful elements seem to be employer relations with labor and methods of insuring fair prices. A straightforward and specific answer from Washington, an out-and-out declaration of policy, would do more to speed up the program than any other move that could be made. Individually we may doubt the outcome of the regimentation of industry, collective industrial planning and Government interference with the busiess organism, but of industry's collective approval of the proximate purpose of the act there can be no doubt.

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IT is a time for plain speaking at Washington, according to Mr. Rossi. The intervention of extraneous uncertainties is the real cause for the slowing up of the national industrial recovery program. As an emergency measure, limited in purpose to spreading employment, raising wages and arresting ruinous price competition, the recovery act initially commanded virtually unanimous approval in industry. It is only because unnecessary complications have been permitted to enter the picture that the first blush of enthusiasm has given way to doubts and fears.

To give a hand in a nationwide drive to raise mass buying power is one thing; to bind one's self to radical changes in employer-employee relationships is another. What industry would like to know is whether it is cooperating in an emergency effort or committing itself to a long-time program of "planned economy," hastily devised and of unproved soundness.

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With a clear understanding of this aim and recognizing that its attainment necessitated the wiping out of certain unfair trade practices, industry started four weeks ago on the first steps toward accomplishment. Furthermore it set out to do the job in the record time demanded. Such slowing down as has occurred is, in my opinion, wholly due to lack of definite information on one or two major issues and the necessity of adopting protective measures against unforeseen and conjectured dangers.

Whether or not there actually is a "labor threat" involved in the signing of codes, industry believes that such a threat exists. In the absence of specific information to the contrary, delay is inevitable. It is natural to be hesitant before the unknown. A simple statement of position on the part of the Administration will remove cause for delay. Industry would like an answer to this question: "Does an industry in signing a code waive its constitutional open shop rights through establishing a law merchant in the industry?"

Main Purpose of Act Should Not Be Forgotten

THE big question is to get men back to work at fair and equitable wages, not details of how this is to be done so long as the methods are fair and honest. There has been too much attention to the few units in industry responsible for unfair trade practices and sweat-shop labor methods and too little recognition of the far greater number that long ago renounced the law of the jungle and adopted a realistic and honest approach to their problems.

Let Washington clarify the major questions now in doubt and I am of the opinion that we shall soon be well on the way to accomplish the ob-

jectives which have been set before us.

Gratifying Results of Association Collaboration

WHILE all of this discussion as to codes, work weeks and minimum pay has been occupying the attention of the press and of the country generally, there has been growing up an influence which will be of immeasurable assistance in assuring the success of the movement. I speak of the new attitude of the industrial associations. It is here that the Government will find the machinery for handling the vexing questions of price competition and unfair practices, provided authority can be given the associations to police the industries they represent.

The changed attitude on the part of industrial units in their relationship one with the other is, in itself, an important accomplishment. It comes about, of course, through realization that at last they have support in eliminating abuses which have been rampant, that they can consider basically sound plans for the industry as a whole with some assurance of success. With their new outlook I believe that they are entitled to a delegation of authority which will make it legal and permissible for them to keep their own houses clean. Whether this will be brought about through penalties levied direct or through application to the courts is presumably a question for each industry. The important point is that any provision made to prevent violation of accepted practices be flexible enough so that its application is automatic and immediate. If it is permitted to lead to long court wrangles or to become smothered in red tape, collapse of the structure is foreordained.

Undoubtedly the actions now pending on the major codes will answer a number of questions, but during this period industry is in an unsettled condition and is entitled to the help that will come from plain speaking and an appreciation of their difficulties in the one place where it will do any good —Washington.

Electrochemists to Meet in Chicago

ELECTROCHEMISTS, chemists, physicists, chemical engineers, and others primarily interested in chemistry are planning a get - together meeting for the week of Sept. 7 to 15 at A Century of Progress. During this time the Electrochemical Society has arranged an attractive program, details of which were announced in its June Bulletin. The latter part of the week, Sept. 10 to 15, has been reserved for the American Chemical Society, both organizations meeting at the Hotel Stevens.

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Advisory and Planning Council Holds Its First Meeting

PARTICULAR consideration was given to the National Industrial Recovery Act at the first meeting of the executive committee of the Business Advisory and Planning Council for the Department of Commerce according to an announcement by Chairman Gerard Swope. The executive committee decided that the council should make a continuous study of activities and developments under the Industrial Recovery Act so that before the end of the 2-year period, recommendations may be made as to what portions of the Act are of permanent value and can be retained with advantage to more closely coordinate production and consumption in the future and to minimize instability of employment to as great an extent as possible.

At the meeting Mr. W. C. Teagle was named chairman of a new committee of the Council to study methods here and abroad, and keep in touch with the activities of individual companies and trade associations in connection with mutually protective and beneficial plans for employees (such as thrift and savings, life and disability insurance, old-age pensions, unemployment insurance, etc.).

Additions to the membership of the Council's Executive Committee were made by the appointment of the following: Walter S. Gifford, president, American Telephone & Telegraph Co., New York, N. Y.; Lew Hahn, president, National Retail Dry Goods Association, New York, N. Y.; W. A. Julian (Treasurer of U. S., Washington, D. C.); A. P. Sloan, Jr., president, General Motors Corpn., New York, N. Y.; Walter C. Teagle, president, Standard Oil Co. of New Jersey, New York, N. Y.

Rotary Electric Steel Co. Makes Appointments

THE Rotary Electric Steel Co., Detroit, has announced the following appointments:

JOHN ANDREWS in an important sales capacity. For the past 11 years Mr. Andrews has been connected with the Detroit district sales office of Republic Steel Corpn.

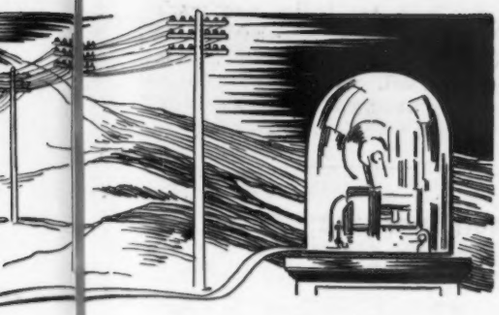
NORMAN F. MELVILLE as chief metallurgist. Mr. Melville has been chief field metallurgist of the Pittsburgh Steel Co., Pittsburgh, for the last six years and previously was chief metallurgist of the Columbia Steel Co., Butler, Pa., and Elyria, Ohio.

E. T. WHARTON as assistant chief metallurgist. Until recently Mr. Wharton was a field metallurgist for the American Rolling Mill Co., Middletown, Ohio.

E. G. STEDMAN as mill metallurgist. Mr. Stedman started his career in the metallurgical department of the Illinois Steel Co. and for the last 14 years has been associated with the Timken Steel & Tube Co., Canton, Ohio, serving for many years as superintendent of melting.

J. A. NOCK as chief chemist. Mr. Nock was chief chemist of the United Alloy division of the Republic Steel Corpn. at Canton, Ohio, for 15 years and earlier had held a similar position with the Union Iron Co., Ironton, Ohio, and the Low Moor Iron Co., Low Moor, Va.

L. F. LOTIER as metallographer in charge of the metallographic department. From 1927 to 1931 he was with the Detroit Edison Co. and recently



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has been connected with the Detroit office of the Air Reduction Sales Co.

J. P. DOAN as service manager. Mr. Doan formerly served the Columbia Steel Co., Butler, Pa., and Elyria, Ohio, in a similar capacity.

Foundry Equipment Feels Upturn

NET orders for foundry equipment among the 13 reporting members of the Foundry Equipment Manufacturers' Association reached an index figure of 45.5. This compared with a previous three months' average of 30.2.

U. S. Steel to Use 27 Additional Lake Ships

UNITED STATES STEEL CORPORATION has authorized an additional 3,000,000 tons of iron ore to be shipped from its northern mines, effective at once.

This will put 27 more ore vessels into service on the Great Lakes, and correspondingly increase all mining and transportation activities to plants. It will be a distinct gain to employment in all the districts affected.

Metals Gaining in Building Construction

INCREASED use of metal in building construction, to supplant units previously made of masonry, is the current architectural trend, said William M. Crane, Jr., of the Copper & Brass Research Association, at the annual convention of the Ohio Sheet Metal Contractors' Association.

"Only a decade or so ago it was sufficient to say the life of a building depends on its roof," said Mr. Crane. "Today, since high steel structures and curtain walls have come into vogue, this statement must be amplified to include wall flashings and waterproofing. Recent surveys have shown that many tall buildings today leak through their side walls. This, of course, is due in most cases to lack of flashing, or inadequate flashing, at set-backs, spandrel beams, and so on. This is also part of the reason why architects and engineers are tending to eliminate masonry where possible, and are turning more and more to metals. Copper cornices are coming back, and metal spandrels, spandrel beam flashings, through wall flashings, and band courses are all being more extensively specified. Today the scope of the roofer is vastly more complicated than ever before, and architects and engineers are looking to the roofer more and more for aid in solving many of their present day problems."

Buffalo Tank Corpn. Raises Wages

BUFFALO TANK CORPN., New York, has increased all men on an hourly rate, 10 per cent in wages, beginning July 24. This increase is in advance of completion of the code for fabricated plate manufacturers. It will affect 200 employees.

Wisconsin Employment Steadily Gaining

FACTORY employment and payroll totals in Wisconsin steadily increased for three months, from the low point reached in March, according to the Wisconsin Industrial Commission. Industrial employment gained 11 per cent during June, compared with the previous month, while the corresponding payrolls increased 19.5 per cent. The current index of employment is 7.1 points above June of last year, while the index of factory payrolls is 15.8 per cent above the same period.

Commercial Drop Forge Code Discussed

A CODE for the commercial drop forging industry was discussed at a meeting of representatives of that industry held in Cleveland, July 19, which was sponsored by the American Drop Forge Institute. There was an attendance of 130 representing about 100 forge shops, making what was said to have been the largest gathering of drop forgers ever held. Charles Stone, Interstate Drop Forge Co., Milwaukee, presided.

A code program was presented by a committee of the Institute. This met with general approval and the drop forgers present not belonging to the Institute decided to join the Institute and make the preparation of a code an Institute affair. With the new members added the membership of the Institute now comprises approximately 95 per cent of the commercial drop forging capacity of the country.

The chairman was authorized to appoint a committee to be announced by mail to draw up a code and as soon as it is completed another meeting of the Institute will be held to give it the stamp of approval.

German Railways Join Unemployment Campaign

THE German State Railways will purchase about 72,600,000 marks worth of locomotives and rolling stock during 1933 in an effort to assist the government campaign to relieve unemployment, according to a report from the American consulate in Berlin made public by the Commerce Department.

These purchases will include 145 steam locomotives, 10 electric locomotives, 221 small locomotives, 109 passenger railway cars, 232 baggage cars and 839 freight cars, the report stated.

The volume of these orders, although considered greater than actual needs, is somewhat lower than the total placed in 1932. (*Mark equals about 34 cents at current exchange.*)

Milwaukee Bridge Gets Brewery Order

MILWAUKEE BRIDGE CO. has just been awarded the contract to supply the Blatz Brewing Co. of Milwaukee with 107 new welded steel storage tank units. This includes not only the tanks but the steel structures for the containers. The completed tanks will give the Blatz Brewing Co. approximately 85,000 barrels added storage capacity in their cold storage room where the beer is aged.

Officials at the Milwaukee Bridge Co. report that their plant has been operating full time and that the Blatz order would not only necessitate maintaining that same pace, but would necessitate adding approximately 150 workers to their payroll. Orders have been placed for 1500 tons of steel for this contract, illustrating how the resultant benefits of this contract are passed along from industry to industry. Work on the tanks will begin immediately and it is expected that the contract will be completed in about 60 days.

One Per Cent Jump in Living Cost in June, Says Conference Board

A FURTHER rise in living costs of wage-earners has taken place, according to the index of the National Industrial Conference Board, the increase between May and June amounting to 1.0 per cent, as compared with the first advance of 0.8 per cent in May. Living expenditures in June, however, required 5.7 per cent less outlay than in June of last year and 26.6 per cent less than in June, 1929.

The purchasing value of the dollar was 137.4 cents in June, 1933—measured on the base 1923 = 100 cents—as compared with 138.7 cents in May.

The largest increase between May and June was found in food prices, which rose 3.3 per cent. Since June, 1932, there has been a reduction of 3.4 per cent in food prices, and since June, 1929, of 37.5 per cent.

Index numbers of component items were as follows:

Item	Relative Importance in Family Budget	Index Numbers of the Cost of Living Average Prices 1923=100		Per Cent Increase (+) or Decrease (—) Between May, 1933, and June, 1933
		June, 1933	May, 1933	
Food*	33	66.2	64.1	+ 3.3
Housing	20	63.4	63.5	— 0.2
Clothing	12	61.6	60.7	+ 1.5
Fuel and light	5	82.2	82.8	— 0.7
(Coal)	..	(76.5)	(77.5)	—(1.3)
(Gas and electricity)	..	(93.5)	(93.5)	(0)
Sundries	30	89.3	89.4	— 0.1
Weighted average of all items	100	72.8	72.1	+ 1.0

*Based on food price index of the U. S. Bureau of Labor Statistics.

Long Term British Steel Trend Shows Gain in Scrap Use

THERE were 72 British furnaces in blast at the end of June, the same number as at the beginning of the month, according to a dispatch from M. S. Birkett, secretary, National Federation of Iron and Steel Manufacturers. The production of pig iron in June amounted to 345,600 tons compared with 339,900 tons in May, and 311,400 tons in June, 1932. The production includes 87,800 tons of hematite, 158,600 tons of basic, 82,800 tons of foundry, and 6700 tons of forge pig iron.

The output of steel ingots and castings in June, which was affected by the Whitsun holidays, amounted to 568,800 tons compared with 599,600 tons in May, and 459,300 tons in June, 1932.

The accompanying table shows the average monthly production of pig iron and steel ingots and castings in 1913, 1920, 1930-1932, and the production in each month since June, 1932.

Production of Pig Iron, Steel Ingots and Castings

	Pig Iron, Tons	Steel Ingots and Castings, Tons
1913—Monthly average	855,000	638,600
1920—Monthly average	669,500	755,600
1930—Monthly average	516,000	610,500
1931—Monthly average	314,400	433,500
1932—Monthly average	297,800	438,100
1932—June	311,400	459,300
July	292,600	438,400
August	259,400	361,500
September	260,400	430,300
October	275,600	439,800
November	267,700	473,800
December	284,500	430,400
1933—January	286,600	444,400
February	270,800	482,700
March	332,200	577,700
April	324,700	509,600
May	339,900	599,600
June	345,600	568,800

Aluminum "L" Train for Brooklyn

THE New York Rapid Transit Corpn. has awarded to the Pullman Car & Mfg. Corpn. the contract for construction of a new type of "L" train, to be placed in service in Brooklyn for experimental use on elevated and subway lines.

The train will consist of a quintuple car made up of five bodies mounted on six trucks. The two end trucks will resemble regular rapid transit trucks, while each of the four middle trucks will carry the adjoining ends of body sections. The train will have a seating capacity of 210 passengers, with a total capacity, including standing room, of 668.

The need for rapid acceleration and braking made it necessary to reduce the weight of the train to a minimum. For this reason, light strong alloys of aluminum have been specified for both car bodies and trucks, with the exception of wheels, axles, springs and similar parts. The entire train will weigh about 130,000 lb., a per passenger weight about half that of a conventional "L" train.

Small Increase in Trackwork

TRACKWORK shipped in June, 1933 according to a report of the American Iron and Steel Institute, amounted to 2471 tons. While this is the largest month's production since May, 1932, it is but one sixth of that of the corresponding month of 1929, which was 14,838 tons. Total trackwork for the second quarter of the current year was 5901 tons, a slight increase over the first quarter.

This tonnage, in net tons, includes all special or fabricated tee rail trackwork (switches, switch stands, frogs, crossings, guard rails and appurtenances) of carbon steel, manganese steel and other metals for both domestic and export use in railway track laid with standard tee rails of 60 pounds per yard and heavier.

June Ohio River Iron and Steel Shipments

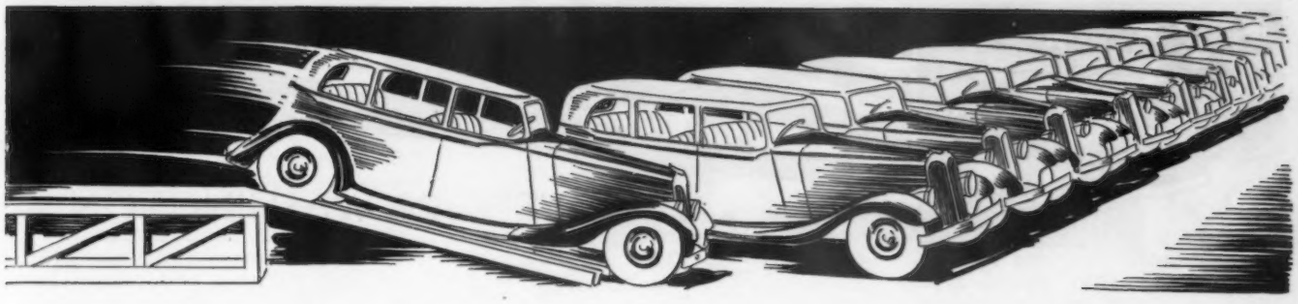
SHIPMENTS of iron and steel products on the Ohio River in the Pittsburgh district during June amounted to 56,484 net tons, as compared with 46,038 tons in May and with 27,306 tons in June, 1932. According to the United States Engineer Office, Pittsburgh, which compiled these figures, Monongahela River steel shipments during June totaled 58,179 tons, as compared with 39,890 tons in the preceding month, and with 18,291 tons in the corresponding 1932 month. Only 815 tons of iron and steel moved on the Allegheny River last month as against 4400 tons in May and 3611 tons in June, 1932.

Mexican Co. Installs Electric Furnace

FRESNILLO CO., of Fresnillo, Mexico, has just installed a size "S" Lectromelt furnace in its shops for the manufacture of steel castings, steel cast tools, grinding balls and wearing mill liners.

This concern has a large accumulation of scrap which by means of the new furnace it is cheaply working into grinding balls and wearing plates.

The furnace is operated by hydroelectric power and is also used for making high strength and alloy iron castings, forging billets, etc.



▲▲▲ THIS WEEK ON THE ASSEMBLY LINE ▲▲▲

July Output Likely to Reach 225,000 Cars

DETROIT, July 24, 1933.

ON a basis of the operating rates of the various companies to date this month an output of 225,000 cars and trucks by the industry is indicated for July, making the third successive month to exceed the 200,000 mark. Key parts producers report sales running ahead of June.

Retail sales, according to factory reports from dealers, are not up to the June level but are running well beyond those of July last year, indicating a gain over the 1932 figures of approximately 75 per cent. How seriously the sharp break in the stock and commodity markets will affect automobile sales during the next few weeks remains to be seen. Unquestionably it will result in a slowing down of the retail business, if its influence is to run true to form.

Adopting the most essential principles of the Administration's recovery program, increasing wages and spreading work, several motor companies have increased pay rates and shortened hours to provide employment for more men even before the industry's code has been drafted.

Chrysler Corpn. on Friday announced a 10 per cent raise in salaries and wages of all employees effective with the current pay period. Approximately 45,000 persons will be affected. Effective July 31, the corporation will have completed and put into operation in all of its Detroit plants a program of shorter hours, upon which the management has been working for several months. Under this program and to handle the increased production and sale of its products the corporation already has increased the number of its employees approximately 70 per cent in the last four months.

Hourly wage rates of all General Motors' divisions were increased 5 per cent early in June. During the past week Chevrolet announced that between 7000 and 8000 men will be added to its payrolls by August 1 as a result of changes made in preparation for the automobile industry's code. Approximately one-half of the additional men already have been hired. Most of the company's manufacturing plants will be placed on a three shift basis, 7½ hours each, for five days a week, with others such as assembly plants on two shifts as employment can be stepped up.

Hudson Motor recently announced increases in hourly wage rates of 5 to 10 per cent. Motor Wheel Corpn. advanced its rates 10 per cent and McCord Radiator & Mfg. Co. also 10 per cent.

Automobile Industry Still Considering Code

ENFORCEMENT of the National Recovery Act should have very little effect on the practices of the Ford Motor Co., according to Henry Ford. "Our wages now are higher than any code is likely to set them," he said. The plants have been working on eight-hour shifts, five days a week, with a minimum wage of $4.00 a day, or 50 cents an hour.

Automobile manufacturers are still working on their code which after a two-day session of the general committee starting Thursday was not completed. Because of the nature of the automobile business it may take some time to formulate a final code for an industry as large, as intricate and as important as the automobile industry. Statisticians are at work compiling data from 1929 to date on employment, wages, earnings, hours and spread of work. Their findings and the conclusions of the committee are expected to be submitted to directors of the National Automobile Chamber of Commerce and representatives of the Ford Motor Co. at a meeting here next Tuesday.

Because of the generally high wages paid by automobile companies and their accomplishments during the past year in the spread of work by staggering employment, adjustments under the new regulations are not expected to be anywhere near as extensive as in many other industries.

The dealers' code, now in preparation, however, is expected to have an important bearing on the retail end. It may revolutionize the used car business, through the control of trade-in allowances. Dealers generally are enthusiastic over the prospect of an iron hand that will cleanse the selling end of certain practices.

Dealer Code to Regulate "Trade-Ins"

THE final dealer code, which will be drawn up by representatives from 24 districts into which the country is divided, meeting at St. Louis, is almost certain to establish control of this phase of the business which plays so vital a part in determining whether or not a dealer operates at a profit. It is generally conceded that the used car end of a dealer's business is responsible more often than not for the losses and eventual failure of many.

It is expected that the code will provide for the establishment of a fixed price on the various models from which dealers cannot deviate whether the car is traded in on a high or low priced car. Prices may vary in different states but will be based on the average selling price over a certain period and probably will be revised monthly.

A leading Detroit distributer believes that the solving of the trade-in problem will reduce dealer turnover by 75 per cent. What this would mean to the manufacturer is apparent when one considers that the cost of obtaining new dealers is estimated at from $1,000 to $1,200 each.

THIS WEEK IN WASHINGTON

GENERAL HUGH S. JOHNSON
Administrator of N.I.R.A.

Steel Industry's Code Will Be Heard Next Week

Hours and Supplementary Labor Clauses Will Draw Union Labor Fire

By L. W. MOFFETT
Resident Washington Editor, The Iron Age

WASHINGTON, July 25.—Unequaled in interest and importance, hearings on the code of fair competition for the iron and steel industry are being eagerly awaited. Scheduled to begin next Monday in the Department of Commerce building auditorium, General Hugh S. Johnson, National Recovery Administrator, will preside over them, assisted by Deputy Administrator Kenneth M. Simpson. J. V. W. Reynders has been chosen as industrial adviser on the code.

The widespread interest in the forthcoming hearings on the steel code is centered chiefly around the open shop declaration it contains. By many this declaration is interpreted as inviting a showdown between the open and closed shop. Coal and other industries are anxiously awaiting to see how steel fares under the attack sure to be launched by the American Federation of Labor against the open shop principle, the only one so far incorporated in any of the some 200 codes filed.

Non-union coal operators have proposed a similar declaration in a code they have determined upon. The motor industry is said to be contemplating similar action. Industries which have been traditionally open shop and insist upon continuing to be are much agitated over the intense activities of organized labor under the National Recovery Act to unionize industry. This is said to explain inclusion in the code of the open shop provision. Open shop advocates increasingly are reported to be insisting that they be permitted to maintain their principles and to state them in codes. There are reports that some industries unless allowed to carry the open shop provision in codes will withdraw them and stand ready for whatever action the Government may institute. While this is held to be a distinctly discordant note in view of the vigorous appeal being made by the Government for cooperation between industry and the Government, the principle, it is maintained, is of such transcending importance that it cannot be yielded. Its adherence, according to its supporters, would help toward cooperation rather than checking it. Organized labor, it is insisted, needs a strong appeal made to it to cooperate with the Government and to forego its intensive propaganda and strong dissents invariably made at code hearings. These dissents were especially marked last week at the numerous hearings on codes.

Organized labor is urging the 30-hr. 5-day week almost uniformly. It is also insisting that rates of pay provided in the codes are inadequate, and in some instances there is little doubt, outside the affected industries themselves, that this is true. But beyond this it appears clear that organized labor has arbitrarily adopted a 30-hr., 5-day-week-higher-pay complex without relation to conditions in given industries or their ability to meet the suggested terms.

Labor Loading Its Guns

IT is understood that organized labor upon receipt of the steel code went vigorously to work to gather volumes of data to fight the code, emphasizing its chief attack on the open shop declaration, but also preparing to attack the proposed 40-hr. week and the rates of pay—25c. to 40c. an hour. On the other hand it is understood that

the American Iron and Steel Institute has been equally as vigilant in gathering material to support its code from the start to the finish. The battle lines thus are being drawn and the proceedings, likely to be dragged out for a week or more, according to present indication, will attract large audiences reflecting all sections of industrial and labor elements.

There are reports current that informal opinion has been given to General Johnson that the open shop declaration is illegal. It is said he has been told in effect that it flies directly in the face of Section 7 of the National Recovery Act providing that employees shall have the right of collective bargaining through representatives of their own choosing. This provision must be carried in all codes. Nevertheless it is considered to be an organized labor declaration and the belief is heightened by the fact that it proceeds to state that no one seeking employment shall be required . . . to join any company union. Specific reference to the company union was written into the law at the direct request of President William Green of the American Federation of Labor.

Company Union Clauses Are "Lightning Rods"

Organized labor of course rejects the contention of steel and other industries operating the open shop that collective bargaining in its true sense can be done through a company union. Organized labor is deaf to the contention that representatives in company unions are selected by secret ballot and therefore represent the free will choosing of fellow workmen for the purpose of collective bargaining. Insistence is made that the companies bring pressure so as to control the company unions.

The issue will thus come to a head perhaps to a degree never before reached. Obviously if General Johnson considers that the open shop declaration is not in line with the National Recovery Law the declaration will be ordered struck out. The General said last week, in reply to a question, that if the open shop declaration is found to "qualify the law" it will be rejected. He took precaution, however, not to pass upon the subject in advance. He has said repeatedly that he does not propose to "approve" either the open shop or the closed shop but proposes only to administer the law as it is given to him. The General is said to have seen various drafts of the open shop section of the steel code before the code was presented formally to him.

In the event it should be rejected there is naturally much speculation as to the stand of the American Iron and Steel Institute as the spokesman for 90 per cent of the iron and steel industry.

THE reported informal ruling made to General Johnson that the open shop provision is illegal and would

have to be changed, if not rejected, supposedly was also based on the conception that it gives employers power to form a national organization without providing a similar vehicle for labor. On the other hand there are those who insist it would give to organized labor that very kind of machinery. This view seems to be based on the thought that organized labor could work its way into company unions, and take them over, thus making it unnecessary for them to attempt their own organizations. These, however, are only a few of many of the rumors centering about the steel code open shop provision and are given principally to indicate the interest and activities surrounding the issue.

Campaign of Cooperation Will Be Launched

The outstanding development in the National Recovery program last week manifestly was the launching of what was called a nation-wide educational program designed to speed the return of prosperity through the expanding of purchasing power of the consumer. While left entirely to their voluntary action, General Johnson sought through telegrams to bring 5,000,000 employers under the far-reaching blanket agreement issued by the President urging shortened hours and increased pay for all employees, white collar and common labor alike. The steel industry has increased both wages and salaries. Gratification has been expressed by the Administration at the response.

The Administrator shares concern with others in the Roosevelt Administration over the failure of purchasing power to catch up with the rise in prices and with what it is said is widespread speculative buying. The stock market breaks, the sharpest since the depression, are held by some to be due partially to this growing divergence between purchasing power and production. General Johnson has said several times that unless purchasing power is increased the country is headed for a tremendous crash.

The President has fixed Sept. 1 as the date by which all codes must be presented. Some of the codes filed but not made public have been described as "terrible." It is evident many will have to go back to organizations for redrafting. Other codes also have been referred to by sources outside the Administration as "cuttlefish" codes. By this it is meant they have purposely "muddied the waters" and were not intended for early acceptance, if accepted at all. General Johnson, however, has not openly criticized any code, but rather has expressed pleasure at the cooperation received from industries generally.

HEARINGS were held last week on codes presented by the shipbuilding and repair, electrical, lumber and cloak and suit industries. Hearings were begun yesterday on oil and other codes. The invariable stand against the hours and wages by organized labor characterized all of them. Conclusion of hearings on the shipbuilding code found builders and organized labor far apart on wages and hours. General Johnson told them to straighten out these differences, for unless this was done soon there might be delay in the 32-naval-shop program. Bids for 17 of the ships will be opened here tomorrow. Agreement was reached later between General Johnson and shipbuilders providing for 34-hr. week in yards with government contracts and 36-hr. week in yards without government work and in ship repair work.

American Standards Takes Over Some B. of S. Functions

WASHINGTON, July 25. — American Standards Association of New York has taken over the work of five divisions of the Bureau of Standards which were virtually eliminated under the economy program. These divisions are simplified practice, safety standards, building and housing standards and specifications. All except the safety divisions were set up by Herbert Hoover when he was Secretary of Commerce. Their purpose was to develop uniformity in products and elimination of waste resulting from a great variety of specifications in manufacture. Safety standards were set up under the administration of former President Wilson. In its policy of doing away with various governmental agencies, the Roosevelt Administration has turned to private agencies to continue the work in its present or modified form.

Secretary of Commerce Roper in announcing that the American Stand-

ards Association would take over the work of the five Bureau of Standards Divisions said he did not know whether the association would make use of the Bureau's facilities. He described the association as a "quasi-governmental agency." It originated about 15 years ago through coordination and consolidation of the American Society of Mechanical Engineers, American Institute of Electrical Engineers, Society of Mining Engineers and Society of Civil Engineers.

Facilities of the Bureau undoubtedly will be used, however, if Secretary Roper gets approval of his request for $450,000 from the Public Works funds for testing materials.

General Johnson Prepares for "Dead Cat" Period

WASHINGTON, July 25.—"I know that sooner or later there isn't going to be all the applause that there is about this thing now, but that the air will be full of dead cats."

Decoded, this explains the reason Industrial Recovery Administrator Hugh S. Johnson has surrounded himself with "industrial adepts" to pass upon codes. Officially, they are known as Deputy Administrators.

A press correspondent apparently was worried because organized labor was not well represented among General Johnson's deputies. So the General proceeded to deal bluntly and piquantly with the issue.

"We are trying in these hearings to get every point of view," declared the General. "And in the organization accepted for Deputy Administrators we have tried to get every point of view, and tried to get men that were able with respect to their points of view, and I think we pretty well succeeded. As to the relations of deputy administrator to the administrator, I attempted to subject them to six tests."

The General began vigorously to set out the six tests, but apparently was so earnest in emphasizing the point that he did not propose to let industry out-trade his deputies that he did not elucidate all the points before he was shifted to other questions. But where he elucidated, he elucidated quite clearly.

While his explanation of the six points was left unfinished, the General gave enough of it to indicate why he is called the best "copy" that Washington has seen in many years.

"The first one," said the General, "is: Is this man an industrial adept, so that when he is confronted with a question that comes before him, he will not be lost; and he won't have his pants traded off him in that hearing. In every one of these hearings and codes it is my responsibility. I must be sure that the deputy has no special interest in the thing he is dealing with. Because I know that sooner or later there isn't going to be all the applause that there is about this thing now, but the air will be full of dead cats.

Wants Men Who Won't Run

"AND when that time comes I want to have some fellow there that isn't going to run. So it comes nearly to this, that when I choose men, I have to take men that I know, and know well, and know all about them.

"And it sometimes so happens that if the specifications pretty largely require industrialists, I have to take men from industry largely in the same manner, and because I have to entrust them with the responsibility that is mine. And I chose General (C. C.) Williams as a deputy administrator because, although his training is in the army, it was in the mechanical branch of the army, and he was in charge of a $24,000,000,000 spending program and I know his training and ability to handle large affairs."

General Williams was chief of ordnance during the World War.

J. V. W. REYNDERS

Deputy Administrator who will advise administration during Steel Code hearings

NIRA Discloses Official Badge

WASHINGTON, July 25.—Details of the design of the official badge to be issued to employers who, in accordance with the National Recovery Administration's Bulletin No. 3, enter into reemployment agreements with the President, were revealed today by Administrator Hugh S. Johnson as follows:

"In the official design the words 'N. R. A.' and '*We Do Our Part*' are in red.

"The '*Eagle*' and the words '*Member*' and 'U. S.' are in blue.

WE DO OUR PART

"The background is white, using the national colors."

The Bulletin announcing the plan to distribute the so-called "employers' badge of cooperation" pointed out:

"For the public to do its part, it must know which employers have done their part to put our people back to work by making these agreements with the President and by codes. Every industry and every employer who has agreed with the President on this plan, or who has had approved a code covering the vital subject of reemployment, will be enrolled as a member of N. R. A. and given a certificate and a Government badge showing the seal of N. R. A. and the words: 'Member N. R. A. *We* do our part.' This badge may be shown on all of the company's equipment, goods, communications, and premises. Lists of all employers authorized to use this badge will be on file at all post offices so that any misrepresentation by unauthorized use of N.R.A. badges can be prevented."

The blast furnace plant at Mayville, Wis., formerly the property of the Youngstown Sheet & Tube Co., will be sold at auction at Mayville on Aug. 2 and 3.

K. M. SIMPSON
Deputy Administrator who will preside at Steel Code hearings

Deputy Simpson Likely to "Retain His Pants"

KENNETH M. SIMPSON, who will preside as deputy administrator at hearings on the steel code before the National Recovery Administration, beginning next week, is president of the International Chromium Process Corpn., 120 Broadway, New York. He has a background and a wide experience that qualifies him to serve on the staff of General Hugh S. Johnson as one of his "industrial adepts." An industrial adept, according to General Johnson's picturesque definition, is one who in dealing with industrialists "won't have his pants traded off . . . to make me ridiculous, because in every one of these hearings and codes it is my responsibility."

Columbia University School of Mines in 1906 with degrees as mining engineer and metallurgist. He spent one year in the engineering department of the Pennsylvania Railroad and had 10 years' experience in mining properties in the West, chiefly as a mining engineer in Nevada. Returning to New York he set up in business as a consulting mining engineer and metallurgist. In the last year of the World War, Mr. Simpson was a technical adviser in the War Department, following which he again went back to New York and practiced as a consulting engineer.

Mr. Simpson graduated from the He spent about one year abroad professionally, mostly in England in an advisory capacity on certain British mining properties. More recently he engaged in the development of chromium.

Mr. Simpson is an intimate friend of General Johnson and Deputy Administrator W. L. Allen.

Iron and Steel Freight Rates To Come Down in South

WASHINGTON, July 25.—Comprehensive adjustment of iron and steel carload rates in the South has been authorized by the Interstate Commerce Commission. It authorizes the rail carriers to establish rates between all points in Southern territory without observing the long-and-short-haul provision of the act to regulate commerce. The territory includes Ohio river crossings, and Virginia, West Virginia and Maryland border points and the area lying to the south. The revision of rates was asked by the Southern carriers at the suggestion of Southern producers of iron and steel articles. They said present rates were not low enough to meet competition at the border points and river crossings with producers in official territory. The carriers now will fix rates to these competitive points on the basis of the scale prescribed in the general iron and steel rate case. The rates to be built up under the relief granted, permitting departure from the long-and-short haul section, are prescribed in a mileage scale. Supplementing it is another scale made up of arbitraries applying to Florida points. The standard line scales begin with a rate of 7c. per 100-lb. for five miles and under and runs to a maximum of 86c. for 1500 miles and over 1475.

Instances of reductions to be brought about include a new rate of 43c., to be cut from 49c., from Birmingham, Ala., to Norfolk, Va.

June Shows Increase in Steel Furniture

WASHINGTON, July 25.—Orders for steel business furniture totaled $685,989 in June compared with $544,383 in May, according to reports received by the Bureau of the Census from 32 manufacturers. In the first half of 1933 orders for this class of steel furniture aggregated $3,097,468 against $4,490,519 in the corresponding period of last year. Unfilled orders at the end of June totaled $456,324 compared with $406,380 at the end of May.

Orders for steel shelving, according to reports received from 14 makers amounted to $178,007 in June compared with $172,042 in May. In the first six months of the current year steel shelving orders totaled $872,923 against $1,274,808 in the corresponding period of last year. Unfilled orders at the end of June totaled $182,011, based on actual inventory. At the end of May they were valued at $173,205.

Notes on Heavy Industry Production in U.S.S.R.

SINCE the beginning of June, the daily output of iron in the U. S. S. R. has been above the 20,000-ton level, reaching a record figure of 22,470 tons on June 14. Magnitogorsk blast furnace No. 2 established a record of 1437 tons, representing a 56 per cent excess over its planned schedule.

Russia is now in second place in world pig-iron production and is the leading producer in Europe.

The new 150-ton furnace of the first Marten furnace section of the Makeev foundry has yielded the first 26 ingots each of 4½ tons. The ingots are destined for the first Soviet blooming mill.

The blooming mill during the first 10 days of June has turned out 1101 tons instead of 1047 per plan. With the new 150 ton Marten furnace in operation the mill will now work day and night shifts.

Within a day or two, the "Krasnaya Sormova" plant is completing before plan a powerful rolling mill for the Makeev Foundry Works. The capacity of the mill will be 1,500,000 tons a year. Total length of the mill is 360 m.; ingots up to 7 tons will be handled.

More Funds Assigned for Road Work

WASHINGTON, July 25.—Assignment of $73,482,478 public works road funds to seven additional states have been announced by Secretary of the Interior Harold L. Ickes as Federal Administrator of Public Works. These approvals bring the total road assignments to $240,014,841 in 31 states and the District of Columbia. The assignments to the seven additional states just announced are: Texas, $24,244,024; Kansas, $10,089,604; Nebraska, $7,828,961; New Mexico, $5,792,935; Mississippi, $6,978,675; Iowa, $10,055,660; Tennessee, $8,492,619.

International Harvester Co. has restored pay rates of October, 1932, at which time decreases from 5 to 10 per cent were put into effect.

First Things Should Come First

Mixing of Emergency Measures with Long-Term "Planning" Has Disturbed Public Confidence

By G. L. LACHER

LAST week's crash of security and commodity markets has released the expected flood of learned "post mortems." The commonest explanation of the crack-up is that it was an inevitable reaction from excessive speculation. Other deductions are that it was a providential punishment for going off the gold standard, and a much needed warning against devaluation of the dollar or other unorthodox monetary experiments. But none of the moralizing that has come to the attention of the writer has mentioned a factor which may have been one of the major causes of the setback. I refer to one of the so-called "imponderables"—that elusive, fickle, unpredictable element in life which for want of a better term may be described as the popular pulse.

No one can forget the unanimous popular response to the heroic measures taken by the President when, at the darkest hour of the depression, he assumed the responsibilities of his office. His courage, his boldness, his directness, his defiance of precedent, his ability to get things done, drove out despair and implanted confidence throughout the nation. Hoarding stopped, banks reopened, paralyzed enterprise gathered new strength. The common man, finally released from the fears which had harassed him without surcease during the dreary months of the depression, began to indulge himself in long-postponed purchases. Business in consumer goods mounted; there was increase upon increase in automobile buying regardless of customary seasonal trends.

Something Happened to Popular Faith

Then something happened. Can it be that the collapse in the values of securities and farm products was due entirely to speculation? Surely speculation for a rise is normal when there is common faith in the dawn of a new day. Technical corrections on a rising market are to be expected, but a drop in values of major magnitude suggests that something happened to underlying popular faith.

Possibly the Administration's recent warnings against speculative buying contributed to the violence of the reaction, but it is doubtful if those admonitions could have had such sharp repercussions if public confidence in the recovery program remained unimpaired.

Washington's plan for recovery, it will be recalled, was originally launched as an emergency measure. There was virtually unanimous agreement throughout the nation that two insidious forces which had to be overcome to pull us out of the depression were wage exploitation and ruinous price competition. All hands were called out to extinguish this fire, and everything went well until some one decided it was necessary to reorganize the fire department.

At the beginning of the recovery program the President very properly warned that the enabling law was not intended "to foment discord and will not be executed as such." Yet, from the very first, organized labor has sought to derive selfish advantages from the act, while employers have been asked not merely to make all the sacrifices but to put their heads in a noose with no assurance of getting free again.

A Confusion of Aims

The iron and steel industry, which long delayed wage cuts when the depression set in and which spread work among a maximum number of employees throughout the period when production was at its lowest depths, has made a sincere effort to comply with the principles of the recovery act. It has not only filed a detailed code with the recovery administration, but has already put into effect a 15 per cent wage advance, not waiting for action on its code. Yet even now it is being bruited about that counselors for the recovery administration have recommended rejection of the code because it "qualifies" the labor provisions of the recovery act.

Revolutionary changes in organization are never wise in a time of emergency. Nevertheless the iron and steel industry is expected to show no concern over being suddenly swept off the open-shop basis, to which it has consistently adhered.

If the recovery program is not merely an emergency effort but really represents the launching of a planned economy in which radical changes in employer-employee relations are contemplated, that fact should be made plain to the country. In such a case the iron and steel industry could properly point out that it is ready to cooperate to the limit to provide jobs and raise employee buying power, but must needs think about its constitutional rights before accepting a long-term plan which would saddle it permanently with the incubus of unionization.

Undoubtedly deep-seated apprehensions that the recovery program will be prostituted to further unionization schemes have done much to unsettle the confidence of a country largely operated on the open-shop principle. The injection of a major disturbing issue in the recovery program, and an essentially unnecessary issue at that, is bound to raise doubts as to the sacrifices that industry can properly be called upon to make.

These doubts could be quickly dispelled by fresh display of the directness and courage that characterized the Administration upon its assumption of power. At that time emphasis was placed on doing "first things first." That rule is just as applicable today as it was then. Our immediate problem is to spread employment and increase buying power. Fundamental changes in the organization of industry should be postponed until the present emergency has passed.

Becomes Pacific Coast Secretary of A.S.W.A

AMERICAN STEEL WAREHOUSE ASSOCIATION has just announced the appointment of R. D. Cortelyou as executive secretary of its Pacific Coast division. This division, which embraces the seven Western States, will be concerned with coordinating price differentials, trade practices and with assisting the parent organization in drawing up a code for the steel warehouse industry. Rapid progress is being made in forming this newly created division, named the Henry Morris Chapter, with headquarters at 218 Chronicle Building, San Francisco.

Navy Wants Bids for Plates and Shapes

Bids will be received by the Bureau of Supplies and Accounts, Navy Department, on August 8, for 1175 tons of plates and 250 tons of shapes for two submarines which are to be constructed at the Portsmouth, N. H., navy yard. The vessels are to be built from funds borrowed from the Public Works Administration.

Steel Production Recedes Further to 57 Per Cent of Capacity

Market Shows Signs of Entering Belated Summer Lull— Scrap Prices Continue to Advance on a Broad Front

INGOT production has declined for the second consecutive week and finished steel demand continues to taper, but the scrap market, always considered a sensitive barometer, has risen to new high levels for the year. Scrap prices have gone up in virtually all market centers except Chicago and St. Louis, and advances of $1 at Philadelphia and 50c. at Pittsburgh have raised THE IRON AGE composite price of heavy melting scrap from $11.58 to $12.08 a gross ton.

It is possible that scrap may be anticipating a rebound in activity early in the fall, because most current indications are that a belated summer recession in steel demand has set in. The national average for steel ingot output has declined from 58 to 57 per cent of capacity, now being two points below the peak reached a fortnight ago. While operations in most market centers have remained unchanged during the past week, the Chicago rate declined from 60 to 56 per cent and the Cleveland-Lorain average from 70 to 67 per cent.

SPECIFICATIONS for most of the lighter finished steel products continue to decline, but releases of bars, plates, shapes, pipe and wire products are growing and in some districts have prevented any decline in aggregate bookings. The automotive industry continues to press for deliveries against contracts but is placing little new business. Retail sales of cars thus far this month have not been up to the June level, and it is feared that they will suffer a further reduction because of the sharp break in the stock and commodity markets. August output, therefore, is difficult to forecast, although a July total of at least 225,000 vehicles is already assured.

The dearth of new business from the motor car makers may be due in part to resistance to recent price advances, which on a few products amount to as much as $10 a ton. Similar opposition to the new quotations has been encountered among other large buyers, who have not yet become reconciled to the abolition of preferential prices. No new general price revisions have been announced outside of an advance of $8 to $10 a ton on lap-weld steel boiler tubes, in line with recent changes in discounts on commercial seamless boiler tubes. Tie plates have been marked up $3 a ton to $1.90 a 100 lb. by one mill, with other producers likely to follow.

EXPECTED shrinkage in the steel requirements of the automobile industry may be counterbalanced by larger demands from the heavy industries. The Naval program will soon result in plate orders and Federal allotments for road building, now being distributed among various States, should stimulate buying of reinforcing steel. Considerable sheet piling will be needed for the Government's river and harbor program. In addition, Government aid is being extended for various municipal and State projects.

Cleveland has asked bids on 2500 tons of welded steel pipe and 1050 tons of fittings, together with 24,000 tons of cast iron pipe. Pasadena will open bids Aug. 15 on 5000 tons of steel plates for a 19-mile conduit, and Los Angeles has taken figures on transmission towers, requiring 7000 tons of steel. Fabricated structural steel awards of the week, at 6225 tons, compare with 7900 tons a week ago. Lettings of reinforcing bars are large, totaling 9250 tons.

Railroad buying has not yet reached significant proportions, although purchases for car repairs are increasing in step with the growth of traffic. The Wabash Railway is in the market for 1500 tons of structural shapes for the repair of 300 freight cars, and the Baltimore & Ohio has made a sizable purchase of repair material for the first time in a long period. Ship repair work also has picked up in anticipation of increased costs following the adoption of the shipbuilding code.

ADVANCES in pig iron prices are now well established and, though new business is light, shipments against contracts continue to increase. At Chicago July shipments are running 30 per cent ahead of those of June. At Cleveland the gain is 40 per cent. A merchant producer has lighted a furnace at Toledo and expects to start a second stack in a few weeks. A merchant unit at Buffalo will probably go into blast before Aug. 1. Three steel works stacks in the Valleys and one at Lorain have been brought in within the past week.

Coke continues strong both because of increased demand and continued curtailment of production as a result of labor troubles. The present market for furnace grade is $2.50 to $3.25, Connellsville, and sellers are reluctant to take contracts for August and September delivery at any price.

THE IRON AGE composite prices for pig iron and finished steel are unchanged at $15.90 a gross ton and 1.973c. a lb. respectively.

▲▲▲ A Comparison of Prices ▲▲▲

Market Prices at Date, and One Week, One Month and One Year Previous
Advances Over Past Week in Heavy Type, Declines in Italics

Pig Iron

	July 25, 1933	July 18, 1933	June 27, 1933	July 26, 1932
Per Gross Ton:				
No. 2 fdy., Philadelphia	$17.34	$17.34	$16.34	$14.34
No. 2, Valley furnace	16.50	16.50	15.50	14.50
No. 2 Southern, Cin'ti	17.61	17.61	16.51	13.82
No. 2, Birmingham	13.00	13.00	12.00	11.00
No. 2 foundry, Chicago*	17.00	17.00	16.00	15.50
Basic, del'd eastern Pa	17.09	17.09	16.09	14.50
Basic, Valley furnace	16.00	16.00	15.00	13.50
Valley Bessemer, del'd P'gh	18.89	18.89	17.89	16.89
Malleable, Chicago*	17.00	17.00	16.00	15.50
Malleable, Valley	16.50	16.50	15.50	14.50
L. S. charcoal, Chicago	23.17	23.17	23.17	23.17
Ferromanganese, seab'd carlots	82.00	82.00	68.00	68.00

*The average switching charge for delivery to foundries in the Chicago district is 61c. per ton.

Rails, Billets, etc.

Per Gross Ton:				
Rails, heavy, at mill	$40.00	$40.00	$40.00	$43.00
Light rails at mill	30.00	30.00	30.00	32.00
Rerolling billets, Pittsburgh	26.00	26.00	26.00	26.00
Sheet bars, Pittsburgh	26.00	26.00	26.00	26.00
Slabs, Pittsburgh	26.00	26.00	26.00	26.00
Forging billets, Pittsburgh	31.00	31.00	31.00	33.00
Wire rods, Pittsburgh	35.00	35.00	35.00	37.00
	Cents	Cents	Cents	Cents
Skelp, grvd. steel, P'gh, lb.	1.60	1.60	1.60	1.60

Finished Steel

Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Bars, Pittsburgh	1.60	1.60	1.60	1.60
Bars, Chicago	1.70	1.70	1.70	1.70
Bars, Cleveland	1.65	1.65	1.65	1.65
Bars, New York	1.95	1.95	1.95	1.95
Tank plates, Pittsburgh	1.60	1.60	1.60	1.60
Tank plates, Chicago	1.70	1.70	1.70	1.70
Tank plates, New York	1.598	1.598	1.598	1.898
Structural shapes, Pittsburgh	1.60	1.60	1.60	1.60
Structural shapes, Chicago	1.70	1.70	1.70	1.70
Structural shapes, New York	1.86775	1.86775	1.86775	1.86775
Cold-finished bars, Pittsburgh	1.70	1.70	1.70	1.70
Hot-rolled strips, Pittsburgh	1.60	1.60	1.55	1.45
Cold-rolled strips, Pittsburgh	2.25	2.25	2.00	2.00

Finished Steel

Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Hot-rolled annealed sheets, No. 24, Pittsburgh	2.25	2.25	2.10	2.20
Hot-rolled annealed sheets, No. 24, Chicago dist. mill	2.35	2.35	2.20	2.30
Sheets, galv., No. 24, P'gh	2.85	2.85	2.70	2.85
Sheets, galv., No. 24, Chicago dist. mill	2.95	2.95	2.80	2.95
Hot-rolled sheets, No. 10, P'gh	1.65	1.65	1.50	1.55
Hot-rolled sheets, No. 10, Chicago dist. mill	1.75	1.75	1.60	1.65
Wire nails, Pittsburgh	2.10	2.10	1.85	1.95
Wire nails, Chicago dist. mill	2.15	2.15	1.90	2.00
Plain wire, Pittsburgh	2.10	2.10	2.10	2.20
Plain wire, Chicago dist. mill	2.15	2.15	2.15	2.25
Barbed wire, galv., Pittsburgh	2.60	2.60	2.35	2.60
Barbed wire, galv., Chicago dist. mill	2.65	2.65	2.40	2.65
Tin plate, 100 lb. box, P'gh	$4.25	$4.25	$4.25	$4.75

Old Material

Per Gross Ton:				
Heavy melting steel, P'gh	**$13.75**	$13.25	$11.75	$8.25
Heavy melting steel, Phila	**11.75**	10.75	9.25	6.25
Heavy melting steel, Ch'go	10.75	10.75	9.25	5.25
Carwheels, Chicago	10.50	10.50	9.50	5.50
Carwheels, Philadelphia	12.75	12.75	10.25	8.00
No. 1 cast, Pittsburgh	**11.75**	11.25	10.50	9.50
No. 1 cast, Philadelphia	**12.50**	12.25	10.25	8.00
No. 1 cast, Ch'go (net ton)	10.50	10.50	8.75	6.00
No. 1 RR. wrot., Phila	**12.00**	10.75	10.75	8.50
No. 1 RR. wrot., Ch'go (net)	9.00	9.00	6.50	3.75

Coke, Connellsville

Per Net Ton at Oven:				
Furnace coke, prompt	$2.50	$2.50	$2.00	$2.00
Foundry coke, prompt	3.00	3.00	2.75	3.00

Metals

Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Electrolytic copper, refinery	8.75	8.75	7.75	5.00
Lake copper, New York	9.00	9.00	8.00	5.37½
Tin (Straits), New York	46.87½	48.00	46.00	20.80
Zinc, East St. Louis	5.00	5.00	4.35	2.50
Zinc, New York	5.37	5.37	4.72	2.87
Lead, St. Louis	4.35	4.35	4.05	2.55
Lead, New York	4.50	4.50	4.20	2.65
Antimony (Asiatic), N. Y.	7.50	7.50	6.50	5.00

On export business there are frequent variations from the above prices. Also, in domestic business, there is at times a range of prices on various products, as shown in our market reports on other pages.

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▲▲▲ The Iron Age Composite Prices ▲▲▲

	Finished Steel	Pig Iron	Steel Scrap
July 25, 1933	1.973c. a Lb.	$15.90 a Gross Ton	$12.08 a Gross Ton
One week ago	1.973c.	15.90	11.58
One month ago	1.904c.	15.01	10.08
One year ago	1.976c.	13.76	6.58
	Based on steel bars, beams, tank plates, wire, rails, black pipe sheets and hot-rolled strips. These products make 85 per cent of the United States output.	Based on average of basic iron at Valley furnace and foundry irons at Chicago, Philadelphia, Buffalo, Valley and Birmingham.	Based on No. 1 heavy melting steel quotations at Pittsburgh, Philadelphia and Chicago.

	Finished Steel HIGH	Finished Steel LOW	Pig Iron HIGH	Pig Iron LOW	Steel Scrap HIGH	Steel Scrap LOW
1933	1.973c., July 5	1.867c., Apr. 18	$15.90, July 18	$13.56, Jan. 3	$12.08, July 25	$6.75, Jan. 3
1932	1.977c., Oct. 4	1.926c., Feb. 2	14.81, Jan. 5	13.56, Dec. 6	8.50, Jan. 12	6.42, July 5
1931	2.037c., Jan. 13	1.945c., Dec. 29	15.90, Jan. 6	14.79, Dec. 15	11.33, Jan. 6	8.50, Dec. 29
1930	2.037c., Jan. 13	2.018c., Dec. 9	18.21, Jan. 7	15.90, Dec. 16	15.00, Feb. 18	11.25, Dec. 9
1929	2.317c., April 2	2.273c., Oct. 29	18.71, May 14	18.21, Dec. 17	17.58, Jan. 29	14.08, Dec. 3
1928	2.286c., Dec. 11	2.217c., July 17	18.59, Nov. 27	17.04, July 24	16.50, Dec. 31	13.08, July 2
1927	2.402c., Jan. 4	2.212c., Nov. 1	19.71, Jan. 4	17.54, Nov. 1	15.25, Jan. 11	13.08, Nov. 22

Pittsburgh Steel Output Holds at 50 Per Cent

Releases on Heavy Rolled Products Offset Decline in Specifications for Lighter Material—Scrap Continues to Advance

PITTSBURGH, July 25.—While specifications for the lighter finished steel products continue to decline as compared with June tonnage, releases on the heavy products, including bars, plates and shapes and pipe, are somewhat heavier and aggregate demand for steel has not fallen off appreciably in this district.

Orders for bars and plates are influenced largely by the fact that specifications against old low-priced contracts must be in by July 31 for shipment prior to Aug. 15. Structural and reinforcing bar tonnage is not affected so noticeably, although some jobs are being rushed toward the letting stage in order to take advantage of minimum prices. The Federal highway program is not yet a factor, although the states are rapidly receiving their allotments, and it is believed that tonnage from this source will begin to reach mills in the early fall. The Government's river and harbor program will also call for considerable sheet steel piling, and naval construction will soon result in large plate orders. Finished steel demand from the automotive industry has not begun to diminish noticeably, and some companies are pressing for delivery on wide sheets. Mills are also having difficulty in meeting the requirements of steel beer barrel makers who have placed heavy orders for hot-rolled and annealed sheets. Tin plate backlogs are still being expanded, partly because of limitation of operations to 16 turns.

Steel ingot production in the Pittsburgh district is holding its own at 50 per cent of capacity, although slight curtailment is reported at one or two independent plants. No additional blast furnaces have been added, although three steel works stacks are being brought in in the Valleys. Steel output in that territory is also unchanged at 65 per cent of capacity, while Wheeling district production is holding at 90 per cent.

Finishing mill schedules are generally unchanged, although butt-weld pipe capacity is engaged at a slightly higher rate. Production of tin plate and sheets has also been influenced adversely by unseasonably hot weather.

The finished steel price structure is without feature, although an advance in lap-welded steel boiler tubes has been announced. Further developments await the final adoption of the steel code, following which quotations will be filed by all producers. These figures are expected to be in line with recent maximum quotations, and are expected to apply to all classes of buyers.

Opposition to sharply higher prices has already been encountered in the automotive industry, where advances of as much as $10 a ton on such products as cold-rolled sheets and cold-rolled strip are now being undertaken. Various other features of the code are arousing considerable discussion, but the most serious objection will undoubtedly come from labor. Jobbers and small buyers also voice objection to the terms of payment specified by the code.

The raw materials market is again featured by an advance in scrap, No. 1 heavy melting steel having been sold at $14 to two consumers in the district.

Pig Iron

Although local merchant sellers have booked little new business at the recently advanced prices, new quotations are being strictly adhered to and are well established on carload lots. Most of the larger consumers in the district are covered for the remainder of the quarter, and steel companies are not interested in booking additional basic tonnage. New inquiry is almost entirely lacking. Shipments are well sustained, although the smaller foundries in the district have not increased their requirements to any large extent. A Valley producer of low phosphorus iron is rapidly cleaning up its stock and plans resumption of production in the near future if demand continues.

Semi-Finished Steel

Shipments to non-integrated makers of tin plate, sheets and strip steel continue heavy, and mills are having little opportunity to accumulate raw steel inventories. The $26, Pittsburgh or Youngstown, price on billets, slabs and sheet bars is well sustained, and a few users have contracted for their third quarter requirements at this level. Forging billets are fairly active, and shipments are well sustained. The price is holding at $31, Pittsburgh. Demand for wire rods from the bolt and nut trade is fairly heavy, and contracts for the remainder of the quarter are being taken at the $35, Pittsburgh or Cleveland, price.

Rails and Track Accessories

Miscellaneous specifications for track supplies are well sustained, but the railroads are not yet doing much new buying. Purchases of both rails and accessories are being considered by most of the large Eastern carriers, but definite action is postponed because of the uncertainty of sustained traffic increases. The local rail mill is engaged on the recent Brazilian order, and has accumulated a little tonnage from domestic carriers. The $2.40 a 100-lb. price on spikes has been reaffirmed for the remainder of the quarter, and revised quotations on other accessories are likely to be filed after the acceptance of the proposed steel code.

Bars, Plates and Shapes

The approach of July 31, which has been set as a deadline for shipments against low-priced contracts on the heavy hot-rolled products, has resulted in increased specifications from practically all classes of buyers. Shipments last week were considerably heavier, and releases with all producers are running well ahead of corresponding June levels. Bars and plates make up the largest share of this tonnage, although structural material is also in slightly better demand. Reinforcing bars continue quiet, but makers expect to get heavy tonnages from the Federal highway appropriations which are just now being allocated to the various States. Railroad purchases are still rather light, and activity in car repair shops is generally calling for increased labor rather than materials. A number of barges were booked by local builders in the last week, and most of the active inquiry has now been closed. Purchases by the oil companies, which have been considered for several months, are still being postponed.

The 1.60c., Pittsburgh, price on bars, plates and shapes is well maintained on new business, and is expected to be firmly established on all tonnage after this month. While some buyers have been paying this figure for some time, its application to the trade in general will mean advances of $2 to $4 a ton to many buyers.

Cold Finished Steel Bars

Specifications are heavier in anticipation of a higher price next month. Makers are unwilling to quote beyond July 31, and it is likely that the increase in the price of hot-rolled bars will be passed on to the trade by means of higher quotations on cold-finished material. Some makers are considering advances of as much as $5 a ton, but no confirmation of this figure is available. Warehouses in particular are taking advantage of

the opportunity to build up their stocks at the current base price of 2.10c., Pittsburgh.

Tubular Goods

Demand for standard butt-weld pipe has shown considerable improvement in the last week, although other forms of tubular goods remain quiet. Stabilization of the oil industry with resultant curtailment in new drilling operations is expected to defer pipe demand from this source for some time, although the ultimate result will undoubtedly benefit the pipe business. In the meantime there has been some hurried drilling in order to avoid prospective Federal restrictions, but pipe requirements for this purpose have not been large. Boiler tubes and mechanical tubing continue fairly active. Railroad requirements are slightly heavier than they have been, but are still very disappointing. No active line pipe projects have appeared, but one or two jobs are being considered which may come out in the current quarter. Makers of lap-welded steel boiler tubes have advanced prices $8 to $10 a ton in line with the recent changes in discounts on commercial seamless boiler tubes. No change is reported on charcoal iron tubing.

Wire Products

Specifications against old low-priced contracts on merchant wire products are fairly heavy, and will probably increase through the week as the deadline for releases approaches. The present schedule calls for completion of shipments on such business by Aug. 15. A few contracts have been taken at the recently advanced prices on merchant wire products, but the new schedules have been given little test. Manufacturers' wire and spring wire are in steady demand, with automotive tonnage predominating. The manufacturers' wire price is well sustained at 2.10c., Pittsburgh.

Sheets

Production is now running considerably ahead of specifications on the majority of sheet mill products, but mill backlogs are still fairly large, and consumers are pressing for deliveries on some types of material. Hot-rolled and annealed sheets for beer barrels are in especially heavy demand, and producers are behind in deliveries on very wide cold-rolled sheets for the automotive industry. Electric refrigerator makers have not yet begun to decrease their requirements, and there is still a fair movement of electrical sheets. Production is well sustained at 55 to 60 per cent, with a number of full finishing units at capacity. Backlogs of most producers are sufficient to sustain this rate during the greater part of August. New business in galvanized and hot-rolled annealed sheets has been booked at 2.85c. and 2.25c., Pittsburgh, respectively, and the market may be said to be well established at these levels. Barrel and drum makers are fairly well covered at the old prices, and will probably not be in the market in large volume before September. Shipments of light cold-rolled sheets to the automotive industry are commanding prices at least $3 a ton over the second quarter, but the 2.60c., Pittsburgh, price on auto body and furniture stock has not been tested.

Tin Plate

Specifications are well sustained, and limitation of production to 16 turns by practically all makers has tended to extend backlogs. The industry is scheduled this week at about 95 per cent of capacity, but excessively hot weather may reduce production considerably. Pressure for deliveries has been noticed recently from canners of cherries. Crop reports on vegetables are not particularly encouraging. Mill backlogs now average eight to ten weeks at the current production rate.

Strip Steel

Releases are fairly well sustained, but the month to date is running about 10 per cent behind the corresponding June period with most makers. Shipments to the automotive industry are undiminished, and there is a steady demand from makers of office equipment, bicycles and miscellaneous manufactured products. A few makers are running at close to capacity, but the average for the industry as a whole ranges from 50 to 55 per cent. The 1.65c., Pittsburgh, price on hot-rolled strip has been applied on a little new tonnage, but most consumers are booked through the quarter at 1.60c., and this figure has not entirely disappeared on orders for immediate shipment. The $2 premium on cooperage stock is now being quoted by all makers. The 2.25c., Pittsburgh or Cleveland, price on cold-rolled strip represents an advance of $9 to $10 a ton to some large buyers in the automotive industry, and these users have naturally been reluctant to place new contracts at the higher figure.

Coke and Coal

Increased demand for furnace coke and continued curtailment of production because of labor troubles have resulted in a rather serious shortage, which has forced asking prices to comparatively high levels. Two or three users who have entered the market in the last week have not yet been able to cover their requirements, and sellers are reluctant to take contracts for August and September delivery at any price. The market is quotable at $2.50 to $3.25, Connellsville, although any sales at this time might demand higher prices. The market on foundry coke is less active, and the price has not advanced from the $3 level which has prevailed recently. The premium grades are still quoted at $4. No changes have been made in coal prices, although the by-product coking grade would demand a high figure if any sales were to be made at this time.

Warehouse Business

Local warehouse distributors of iron and steel products have revised their prices upward in line with higher mill quotations. Sheets are $1 to $3 a ton higher, and nails, wire and rivets have been advanced $5 a ton. Demand for steel out of warehouse has been expanding for several weeks, but has scarcely kept pace with the recent improvement in mill shipments.

Scrap

Purchases of No. 1 heavy melting steel by two consumers has established the market at $14 a ton, a 50c. advance over the last sale into consumption. Similar advances have occurred in No. 2 railroad wrought, scrap rails, compressed sheets and hand bundled sheets. Specialties are notably strong at an advance of $1 a ton, sponsored chiefly by a growing scarcity in this class of material. Cast grades are also stiffening. In the Youngstown district, sales of No. 1 heavy melting steel have been reported at $13.75. With Pittsburgh mill operations facing a likely recession in August, scrap dealers believe that the upswing in prices is practically spent. Nevertheless, at least one large buyer is believed to need scrap rather badly and will probably place orders during the current week at around recent levels.

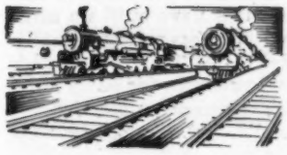
Another Blast Furnace to Go In at Buffalo

BUFFALO, July 25.—The pig iron market is easier. Sales range from carload lots up to 100 or 200 tons. A 700-ton inquiry came out during the week. Furnaces are not quoting for later than October delivery. Hanna Furnace Corpn. will probably blow in a furnace before the end of this month.

Steel production is unchanged, with 15 open-hearths active at Bethlehem's Lackawanna plant, five at Republic, and two at Wickwire-Spencer. The Seneca sheet division of Bethlehem continues to operate at 70 to 75 per cent.

Scrap is very firm. It is now reliably reported that the recent purchase of No. 2 heavy melting steel by a local mill was at $10.50 instead of $10.25. Dealers are offering $10 freely to fill this order. No. 1 machinery cast sold during the week at $12.25. The largest consumer has apparently had its immediate wants satisfied by large shipments of boat scrap and has not offered more than $10.50 for No. 1 steel.

Chicago Steel Production Declines Four Points



Present Rate Is 56 Per Cent of Capacity—Pig Iron Shipments 30 Per Cent Ahead of June — Scrap Marking Time

CHICAGO, July 25.—Ingot output has dropped four points to 56 per cent of capacity. However, there has been a rebound both in sales and specifications of finished steel and the expectation is that the new rate of production will hold for some time.

Price announcements on plates, shapes and bars for either August or the remainder of the third quarter are still being withheld and present quotations are effective only until July 31. All other steel mill products are now quoted on the basis of the remainder of the third quarter.

Railroad purchases are confined to track fastenings and the needs of repair shops. The director of purchases under the Federal coordinator for the railroads has held informal meetings in Chicago this week.

The scrap market is marking time. Dealers have been trying to keep supplies flowing to them and at the same time offer producers less. The move has not been successful and bids have had to be raised close to the point where they stood a week ago.

Pig Iron

Shipments of Northern foundry iron in July will exceed the total in June by at least 30 per cent. This gain is significant for the reason that it now indicates a foundry melt that is not far from 45 per cent of what might be normally expected in July. Some users are now buying refill tonnages, their melt having exceeded their estimates. Purchases for the remainder of the third quarter are steady and prices are firmly fixed at $17 a ton, local furnaces. A small cargo of silvery has reached Chicago, and another boat load is expected in the near future.

Warehouse Business

Prices are being revised on galvanized sheets, nails, bolts, nuts and rivets. The new quotations are 4.10c. for galvanized sheets for city delivery and 4c. for delivery in the country; 3c. for structural and boiler rivets; $2.45 for common and cement coated nails to dealers, and $2.55 to industrial users. New discounts on machine and carriage bolts, lag screws and nuts are 70 per cent off list for 1000 lb. and over, 65 per cent for 200 to 1000 lb., 60 per cent for 100 to 200 lb., and 50 per cent off list for less than 100 lb. Demand continues to grow and orders are at the peak of the year.

Rails and Track Supplies

A few small rail releases have reached local mills, which continue to produce on very light schedules. All current shipments are going into track work and most new rails that railroads had stocked have now been put into use. The situation appears to be set for at least a moderate buying movement in the early fall. Demand for track accessories is steady.

Plates

Fabricators still have fair schedules, but new tonnages ordered from mills are dragging. Brewers appear to be catching up with their needs for tanks, and business from this source is lighter. Oil country tank orders are small and scattered. The railroads, meeting with difficulties at times in furnishing types of cars needed, are going in for heavier car repairs and are taking more steel.

Wire Products

Output is being revised downward, the average now being slightly under 60 per cent of capacity. Mill stocks are said to be somewhat ragged and not all producers are taking steps to get a better balance. New buying and specifications, after following a downward course for several weeks, are again turning upward, though the change is not very sharp. Prices are steady. Crop reports remain unfavorable in many parts of the Central West.

Structural Material

The only tonnage of note now before the trade is the 2800 tons for bridges on which Illinois will open bids July 31. Private work is at a standstill except for an occasional small tonnage. It is probable that within the next week or two a Chicago district shop will start to fabricate its share of the San Francisco Bay bridge. Fabricators in this area are engaged between 10 and 20 per cent of capacity.

Reinforcing Bars

This market is closely tied up with State road and bridge work. Some contracts have been awarded, but much of the tonnage that can be expected from this source is not yet available to rolling mills. Prices are firm and most dealers are convinced that higher quotations will be made in the not far distant future. More bars are now being shipped against old road contracts in Illinois. A change in slab design in this State is holding back awards on new work.

Cast Iron Pipe

Government-aid projects are moving very slowly. One reason is that the process of obtaining loans is slow; another is that in many communities there is growing resistance to additional public debt.

Sheets

Prices are firm and output has changed little since the middle of the month. Pressure for deliveries has not lessened and new purchases are quickly put in the form of releases.

Bars

Although ingot output is lower there is practically no change in demand for bar mill products. Agricultural machinery plants and railroad shops have larger requirements and it is now said that the former may have still larger programs in August. It is thought by local sellers that the drop in automobile production for August will be less than has been anticipated. Small consumers, quite frequently pressed for ready cash, continue to buy small lots at a uniform rate.

Bolts, Nuts and Rivets

Average specifications in July are slightly ahead of the June rate. However, new buying is slow and spotty.

Scrap

Dealers in heavy melting steel have lowered their prices to producers and are not able to bring out much tonnage. Few are willing to sell at $10.25, but dealers' offers of $10.50 bring out sufficient tonnage to meet current demands from mills. Consumers of this grade are quietly watching the market and several of them may at any time step in for tonnages. Some heavy melting steel is moving away from Chicago by boat. Borings are less active except for shipment to Kokomo, Ind., where several dealers have orders.

Scrap Continues Strong at Detroit

DETROIT, July 25.—The sharp break in stocks and commodities last week had tendency to slow down the scrap market slightly, but activity has broken out anew this week, with the market again strong. A moderate tonnage has been purchased by the local mill, which is continually in market. Substantial sales were made last week to the Valley district.

Steel Buying Tapering in Eastern Pennsylvania

Railroad Buying, However, Is Showing Signs of Revival—Scrap Is Strong, With Prices Higher — Steel Output Sustained at 41 Per Cent

PHILADELPHIA, July 25.—While steel buying has tapered off somewhat, it is still holding up well for this season of the year. Specifications for plates and shapes are coming to mills in fair volume, marking the windup of the lower prices which were extended through July. On Aug. 1 levels go to 1.70c., Bethlehem, on shapes, and 1.70c., Coatesville, on plates. Railroad buying is confined to small individual lots for repair work, but in the aggregate reach a sizeable tonnage. The Baltimore & Ohio for the first time in a long period is buying steel for repair to cars. Automotive requirements in sheets have slackened somewhat, but still remain in good sized volume. A decrease in pig iron purchases had been expected in view of the recent market activity of melters but is expected to pick up again soon, since no stocks have been accumulated.

The scrap market is strong, with prices rising rather sharply. No. 1 heavy melting steel has moved up another $1 to $11.75.

Open-hearth operations remain at 41 per cent of capacity.

Pig Iron

Foundries have curtailed purchases following their recent buying activity. They have not piled up stocks, however, and in view of their increased operations are expected to come into the market soon again for fair-sized tonnages. Blast furnace operators report that the recently increased prices are holding up well.

Plates, Shapes and Bars

Low prices on shapes and plates expire with the end of the month, with the result that specifications are being received by mills in fair volume. The new levels will be 1.70c., Bethlehem, on shapes, and 1.70c., Coatesville, on plates. Merchant steel bars will continue to be quoted at 1.60c., Pittsburgh. Steel bars sales are holding up well, business coming from miscellaneous sources, including railroads, chain makers and jobbers. Plate mills are taking larger tonnages from shipyards for repair work and also for boiler and tank construction. The Baltimore & Ohio Railroad has placed orders for plates, shapes and bars for car repair work. This is the first sizeable buying by this carrier in a long time and is a reflection of increased carloadings.

Sheets

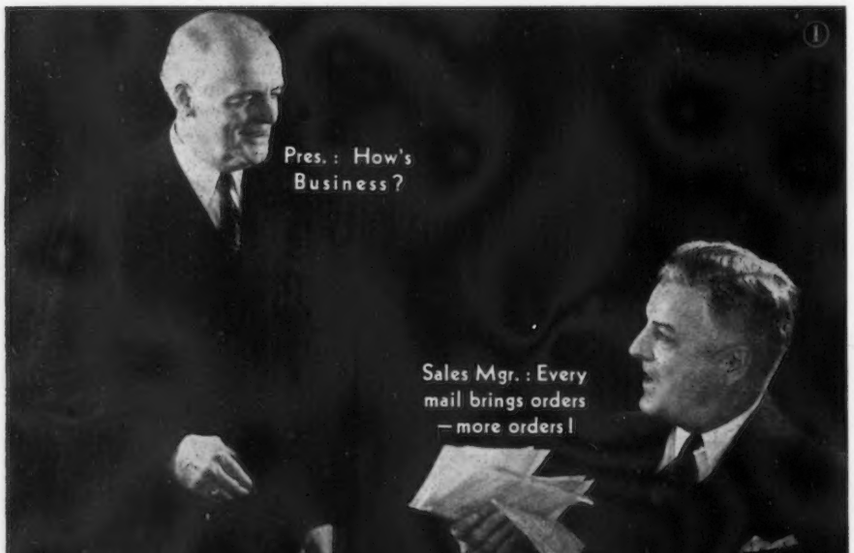
Automotive requirements have let down somewhat but still are on a fair scale. Sheet mills have built up large backlogs and are operating heavily. Extended deliveries have been made necessary and pressure for early shipment is being brought to bear on the mills, especially by automobile body builders.

Warehouse Business

While the volume of business has fallen off somewhat, it is still holding up well. Prices are unchanged.

Scrap

The market continues to rise. No. 1 heavy melting steel has advanced $1 to $11.75, while other grades reflect sharper increases. Brokers are offering $11.50 for No. 1 heavy melting and $10.50 for No. 2 heavy melting steel and are finding it difficult to cover even at these levels. Fair-sized lots of No. 1 railroad wrought and No. 1 forge fire have been sold at $12 and $10.50, respectively, and other grades have advanced correspondingly.



Bids Taken on Large Coast Projects

SAN FRANCISCO, July 24.—Bids are to be opened Aug. 15 at Pasadena for constructing 18.5 miles of 36-in. conduit from Pine Canyon Dam to the city. Schedules call for 4220 or 5080 tons of steel plates with reinforced concrete alternates. At Los Angeles it is reported that the Towers Builders, Inc., is low on 2300 tons of shapes, while McClintic-Marshall Corpn. is low on 7000 tons for transmission towers for the Bureau of Water and Power.

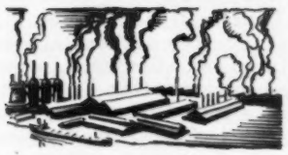
Governmental building activity is marking time, pending release of Federal funds. Private projects, involving small tonnages, continue to increase in number.

Steel awards during the week totaled 1020 tons of shapes and 8947 tons of reinforcing bars, the latter including 8700 tons of bars recently taken by the Pacific Coast Steel Corpn. for the sub-structures on the San Francisco-Oakland bridge.

Cast iron pipe inquiries now pending total 8742 tons, outstanding among which are 3696 tons for Alderwood Manor, Wash., and 4469 tons for Snohomish, Wash.

Metropolitan Water District, Los Angeles, has awarded 300 tons of hollow drill steel to the Crucible Steel Co. of America.

Month-End Increase in Specifying at New York



Releases for July, However, Will Fall Behind Those of June — Advance in Plain Wire Expected

NEW YORK, July 25.—Steel bookings in this district so far this month have fallen behind those of June. However the volume has been larger than was anticipated and specifications this week are expected to boost the monthly total materially. Releases on products like bars, shapes and plates and wire products on which prices were extended until July 31 are steadily increasing as the "deadline" approaches. This has been particularly true of wire products. Tin plate specifications continue in good volume, with mills virtually sold out until Oct. 1. An advance in plain wire is considered an early possibility, but a higher price on tin plate is still problematical.

The reinforcing bar trade finds encouragement in the fact that about one-third of the States have already met all requirements to qualify for allotments of Federal funds for highway construction. It is a question, however, how much of this work can get under way this year in view of the advanced season.

Eastern plate prices will be advanced to 1.70c., Coatesville, Aug. 1. Specifications at lower figures are in fair volume. The steel trade is disappointed at the failure of Washington to take action on a number of major building projects on which bids were held up last spring. In some cases substructures have been completed and only the award of contracts for the superstructures is necessary to release orders for several thousand tons of steel.

The proposed steel code is being carefully studied by buyers and sellers. The establishment of the single price system is a radical departure, since it has always been the custom of the steel trade to grant concessions on large tonnages. Whether a system of quantity differentials will be worked out for the benefit of the larger buyer is a question that no one in the trade seems to be able to answer at this time.

Pig Iron

Consumers are taking heavy shipments against contracts. Local sellers expect July shipments to outrun those of any month this year. Current inquiry is light. Large melters have their third quarter needs fairly well covered, and sellers expect several weeks of negligible activity, with new buying confined to small foundries covering in carload lots against day-by-day requirements. Aggregate sales were 2500 tons, compared with 4500 tons the previous week and 2000 tons a fortnight ago. The recent $1 a ton advance is well established, and late third quarter business is being booked at current price levels. Furnaces are somewhat confused about delivery prices from the various established basing points. The 50c. a ton differential on shipments into Connecticut was eliminated during the past week. The Port Henry furnace will blow in this week, and Hanna Furnace Corpn. will light two Buffalo stacks early in August. Import brands are receiving moderate attention at the newly established price levels.

Reinforcing Bars

A steady flow of small tonnages from private projects serves to keep local sellers moderately active. Quoted prices are firm on small-lots, and price shading is less frequent on large tonnages. No sizable tonnage was booked during the past seven-day period. A Boston sewer job took 125 tons, and miscellaneous construction absorbed several hundred tons. Pending awards include 2200 tons of rail steel bars for a Buffalo storm sewer, and 230 tons of 1¼-in. squares for export to Panama. August specifications are expected to expand sharply when New York highway projects mature.

Scrap

Supported by well developed buying, the local market continues increasingly active and quotably strong. During the week a 50c. advance to $7 a ton, barge, was made on No. 2 heavy melting steel. Other grades rose sharply on active bidding. Quotations for rail delivery, heretofore nominal, have been tested for several grades on moderate movements of steel. No. 1 and No. 2 heavy melting steels are currently established at $7.75 and $6.50 a ton for car loading. A $1.50 rise advanced No. 1 railroad wrought to $7, barge, and $6.50 for rail shipment. Considerable tonnage is moving at present price levels, and well sustained industrial activity serves to maintain an extremely buoyant market. The low dollar position on foreign exchanges has occasioned a reappearance of heavy and diverse export inquiry. Dealers are showing little interest, however, in export commitments, and such inquiry is building up a potential foreign market which will be liquidated when domestic demand eases and price levels stabilize.

②
Pres.: How's Production?
Prod. Mgr.: W-e-l-l Better, Much better — But right now we're waiting for Steel
RYERSON STEEL SERVICE
continued on next page

Steel Output Eases Off Further at Cleveland

District Rate Is Now 67 Per Cent of Capacity—Two Blast Furnaces Lighted —Scrap Market Is Advancing

CLEVELAND, July 25.—While most consumers are still getting orders against old specifications, new demand for finished steel in small lots is holding up fairly well, although the tonnage entered is running behind June. There was more activity in sheets during the past week than during the previous week or two, business coming from diversified sources. The automotive industry is not placing much tonnage, but is crowding for deliveries against old specifications.

Ingot output in the Cleveland and Lorain district has taken another slight drop, declining to 67 per cent of capacity this week following the taking off of an open-hearth furnace by the Otis Steel Co.

The Interlake Iron Corpn. lighted one of its Toledo stacks today and contemplates starting its second Toledo furnace in a few weeks. The National Tube Co. blew in another furnace at Lorain July 19.

Public work continues to develop and will have its effect on the volume of steel business when some of the pending projects reach the contract stage. Cleveland has asked for bids for 36 miles of water mains requiring 24,000 tons of cast iron pipe, 2500 tons of welded steel pipe and 1050 tons of fittings. However, changes may be made in some of the pipe used that will result in changes in the respective tonnages. Toledo has taken bids for dock work requiring 700 tons of sheet steel piling.

Scrap prices have again advanced, heavy melting steel being marked up $1 a ton. Other prices are unchanged. Generally the market has a firm tone, although occasional concessions are reported on some grades of sheets, which will disappear when the proposed steel code becomes effective. An important change in this code is the elimination of Detroit as a basing point for hot-rolled and cold-finished bars. The reason given for this change is that having a Detroit basing point for two products but not for other steel products did not prove entirely satisfactory.

Pig Iron

Sales have been limited to small lots for prompt shipment. Little inquiry is pending. Operations of both jobbing and specialty foundries show distinct improvement. Shipments continue good and are well diversified. July shipments by a leading producer are 40 per cent ahead of June.

Bars, Plates and Shapes

Demand for merchant bars is only moderate, but it is expected that there will be an improvement before the end of the month because of the establishment of the 1.65c., Cleveland, price for all consumers after July 31. There is still a good demand for plates from the brewing industry and for carlots from diversified consumers. An Ohio fabricator has taken 90 small tanks for a Cincinnati brewery, requiring 200 tons, and Akron and Mansfield breweries have placed orders requiring 100 tons. With no additional public work out for bids, structural inquiry is limited to small lots. Cleveland will take bids July 27 for an incinerator requiring 600 tons of steel, including 150 tons of armor plate.

Strip Steel

New demand is not very active, but mills have considerable tonnage on their books and are being crowded for deliveries. Prices range from 1.60c. to 1.65c., Pittsburgh. All makers are now quoting cold-rolled strip at 2.25c., Cleveland.

Sheets

Miscellaneous demand improved the past week. Recent mill operations are being maintained. Mills still have a considerable backlog of business and are being crowded for shipments by the automotive industry. Steel barrel manufacturers have increased operations. While most business is being taken at the new prices, concessions occasionally are being made on hot-rolled annealed sheets and to 2.50c. on auto body sheets for immediate specifications.

Iron Ore

Most of the underground mines in the Lake Superior district still idle are expected to resume operations in the fall. These accumulated large stocks last year, when the properties were operated to furnish employment for the miners. The ore movement will be further increased in August with the placing in commission of 40 additional boats by the Pittsburgh Steamship Co., the United States Steel Corpn. having authorized the shipment of 3,000,000 tons additional of ore this season. The movement for the season is now estimated at 20,000,000 tons, a considerable increase over recent expectations. Miners in the Lake Superior district have been granted a wage increase of approximately 15 per cent and all miners have been put on an 8-hr. day. While underground miners have been working 8 hr., surface workers in Michigan have been on a 9-hr. sched-

③
Waiting for Steel? We've been waiting for orders for three years, now we wait for Steel?
RYERSON STEEL SERVICE
continued on next page

ule, and those on the Mesabi Range on a 10-hr. schedule.

Scrap

Prices have again advanced, heavy melting steel being marked up $1 a ton and most other grades 25c. to 50c. Dealers are paying $13 and $12 for Nos. 1 and 2 heavy melting steel against recent orders taken in the Youngstown district and $10.50 for machine shop turnings for the Pittsburgh district. A local mill is buying small lots of heavy melting steel at slightly above quoted prices. Shipments slowed down slightly this week, because of reductions in open-hearth operations.

Railroad Buying Picking Up at St. Louis

ST. LOUIS, July 25.—Shipments of pig iron by the St. Louis Gas & Coke Co. against contracts have been very heavy this month, although new business has been light.

The Missouri Pacific has bought 1,500,000 tie plates from the Scullin Steel Co., St. Louis, the Sheffield Steel Corpn., Kansas City, and the Colorado Fuel & Iron Co., Denver.

Construction of tanks for breweries continues active. One brewery awarded 200 tanks, requiring between 500 and 600 tons of plates, to the St. Louis Structural Steel Co. Other brewery projects are being considered.

The Wabash Railway is inquiring for 1500 tons of shapes for the repair of 300 freight cars in its shops at Decatur, Ill.

Scrap prices are unchanged but the market continues firm.

Pig Iron Shipments Show Gain in South

BIRMINGHAM, July 25.—In the pig iron market both spot sales and contracts are light, as most foundries have already covered for this quarter. Current business is on the new base of $13, but there will be little benefit from the advance until toward the end of this period. Nine blast furnaces are operating, the same as for the past two weeks. Four are on basic iron, four on foundry and one on recarburizing iron. July shipments of merchant producers are, in the aggregate, exceeding those of last month.

There has been a slight recession in steel bookings the past two weeks, but this has not affected plant operations, as backlogs have been sufficient to permit steady schedules throughout the month. July has fallen behind June in some of the heavier lines, such as railroad products and plates.

Scrap Market Buoyant in New England

BOSTON, July 25.—New prices on Mystic, Buffalo and eastern Pennsylvania irons have been officially established on the code basis, and sales have been made at these quotations. Alabama furnace representatives have not received official notice on prices but assume the new code is to be strictly adhered to. Sellers of Indian iron have adopted 25c. silicon differentials. Recent fresh arrivals of Dutch iron at Providence, R. I., have created some selling pressure on the market, but actual sales are reported small. No inquiries of importance are in evidence.

The scrap market is excited, and prices on the most active materials, including No. 1 heavy melting steel, steel turnings, steel mill borings and chemical borings, are higher.

Sustained Sheet Demand at Cincinnati

CINCINNATI, July 25.—The usual sales recession following a price advance was not so pronounced in this market, the past week, as on former occasions when quotations have been increased. Bookings totaled about 600 tons, of which 350 tons was Southern iron and 50 tons silvery.

Steel

Sheet demand has expanded further, but at a slower rate than heretofore. Bookings were slightly in excess of 75 per cent of mill capacity. Orders are unevenly distributed over the various grades of sheets, but the leading mill interest indicates that the average backlog would be about equal to two weeks' operations at the present rate of output.

Scrap

Liquidation of yard supplies has slackened, reducing the amount of scrap available for mill use. Those in possession of any quantity of material are reported to be holding for higher prices, forcing dealers' bids on important items still higher. Movement of scrap on old contracts is fair, but new dealings are unimportant.

Youngstown to Add Alloy Steel to Line

YOUNGSTOWN SHEET & TUBE CO., Youngstown, Ohio, will add alloy steel to its present line of products. A new alloy steel department will be organized in charge of Harry Ross Jones, who was president of the United Alloy Steel Corpn., Canton, Ohio, which was merged with the Central Steel Co. to form the Central Alloy Steel Corpn. For the past three years he has been president of the Ohio Ferro Alloys Corpn., Canton.

Railroad Equipment

E. I. du Pont de Nemours & Co., Inc., has purchased six 10,000-gal. tank cars from General American Tank Car Corpn.

Pennsylvania Salt Mfg. Co. has bought three 4000-gal. acid tank cars from American Car & Foundry Co.

Sales Mgr.: Great, that will help our sales record
Purch. Agt.: Fine, we can depend on Ryerson stock shipments
Pres.: I want you to buy your steel from Ryerson—They have it in stock and will ship at once
RYERSON STEEL SERVICE

British Pig Iron Price Rise Impends

LONDON, ENGLAND, July 25 (*By Cable*).—Improvement in general inquiry forecasts an imminent advance in the domestic price of hematite, although prices of pig iron remain unchanged this week. Steel is rather more active than it has been although orders remain small. Tin plate is quiet, but specifications are being made more freely than in the immediate past.

Continental Steel Cartel has reduced the prices of steel bars for the United Kingdom by five shillings to two pounds fifteen shillings, gold, and is expected to grant further concessions on plates but to advance the U. K. price on shapes.

The following C.I.F. prices on steel bars are now fixed, retroactive to July 5:

For Shanghai and Yokohama	£5 7s.	(paper)
For Philippines	$24.60	(paper)
For Buenos Ayres	440 fr.	
For Brazil	£5 8s.	(paper)
For Portugal	440 fr.	
For Greece	443 fr.	
For Stockholm	£5 2s. 3d	(paper)
For Oslo	£5 1s.	(paper)

Above prices on the basis of calculation as follows:

£1 (gold) 1.45 paper pounds
£1 (gold) 4.86 gold dollars
$1 (gold) 1.35 paper dollars

According to the rules of the Cartel, no concessions from the above prices may be given by exporters or their agents.

A number of Belgian steel producers have formed a central sales agency, known as "Union Pour la Métallurgie" to handle all of their sales. Members of this include the Sociétés Anonymes John Cockerill; Métallurgique de Sambre et Moselle; Aciéries d'Angleur; Laminoirs, Hauts-Fourneaux, Forges, Fonderies et Usines de la Providence and d'Athus Grivegnee.

South Africa has purchased 3500 tons of Canadian rails.

British Prices f.o.b. United Kingdom Ports

Per Gross Ton

Ferromanganese, export	£9		
Billets, open-hearth	£5	to	£5 7s. 6d.
Black sheets, Japanese specifications	£11		
Tin plate, per base box	17s.	to	17s. 3d.
Steel bars, open-hearth	£7 17½s.	to	£8 7½s.
Beams, open-hrth.	£7 7½s.	to	£7 17½s.
Channels, open-hearth	£7 12½s.	to	£8 2½s.
Angles, open-hearth	£7 7½s.	to	£7 17½s.
Black sheets, No. 24 gage	£9		
Galvanized sheets, No. 24 gage	£11	to	£11 10s.

Continental Prices f.o.b. Continental Ports

Per Metric Ton, Gold £ at $4.86

*Ingots	£2 5s.		
*Billets, Thomas	£2 7s.		
Wire rods, No. 5 B.W.G.	£4 10s.		
Black sheets, No. 31 gage, Japanese	£11 5s		
*Steel bars, merchant	£3		
*Sheet bars	£2 8s.		
Plates, ¼ in. and up	£3 18s.	6d.	
*Plates, ⅛ in. and 5 mm.	£4 1s.		
*Sheets, ⅛ in.	£4 6s.		
*Ship plates	£4 10s.		
*Beams, Thomas	£2 16s.	6d.	
*Angles (basis)	£3		
Hoops and strip steel over 6-in. base	£3 12s.	6d.	
Wire, plain, No. 8	£5 7s.	6d.	
Wire nails	£5 15s.		
Wire, barbed, 4-pt. No. 10 B.W.G.	£8 15s.		

*Prices as established by European Raw Steel Cartel.

Steel Corporation at Quarterly Meeting Reports Profit in June

THE directors of the United States Steel Corpn., at their meeting July 25, voted a ½ per cent disbursement on the preferred stock for the quarter ended June 30. The total deficit for the quarter, provided from surplus, was $10,428,772, compared with a deficit of $18,531,676 for the first quarter and $26,757,092 for the corresponding quarter of last year. In a statement issued by Chairman Myron C. Taylor, it was pointed out that June operations, which represented 36.1 per cent of capacity, showed net earnings of over $4,000,000 before deductions for depreciation and other charges, and that July operations will average about 53 per cent of capacity. It was also stated that wage advances will increase the total payroll by more than $2,000,000 a month.

The financial statement was in brief as follows:

	Second Quarter	First Quarter
Earnings	$4,881,554	$3,795,472*
Depreciation, obsolescence, etc.	10,606,589	9,603,706
Deficit	$5,725,035	$13,399,179
Interest charges	1,301,553	1,312,232
Total deficit from operations	$7,026,588	$14,711,411
Allotment of overhead, Lake Superior ore properties and Lakes transportation	1,600,779	2,018,860
	$8,627,367	$16,730,271
Dividend on preferred stock	1,801,405	1,801,405
Total deficit from surplus	$10,428,772	$18,531,676

*Deficit.

Mr. Taylor's statement is as follows:

Operating results in the second quarter showed a continued improvement. In month of April the net (before deduction of depreciation and other charges) was a deficit of $763,380, while for month of June operations (before deduction of depreciation and other charges) showed net earnings of $4,165,870.

After deduction of all charges, including depreciation but exclusive of preferred dividend, the results in comparison with previous year were:

	1933 (Deficit)	1932 (Deficit)
June	$488,729	$4,687,290
Quarter ended June 30	8,627,367	20,452,173
Quarter ended March 31	16,730,271	13,218,550
Six months ended June 30	$25,357,638	$33,670,723

Shipments in Percentage of Capacity

	1933	1932
April	20.4	20.7
May	25.7	19.5
June	36.1	17.2
Quarter ended June 30	27.5	19.1
Quarter ended March 31	15.8	23.0
July will average	53.0	...

On July 1, wages were increased in the coal departments of the subsidiary companies. On July 16 advances were made in substantially all other departments, except by transportation subsidiaries, of an average of about 16 per cent. The advances of July 16 were made in conformity with the schedule of rates embodied in the code submitted by the steel industry under the National Industrial Recovery Act, and in anticipation of its adoption for purpose of contributing immediately to the Government's efforts for increased employment and compensation of labor and to assist in the plan for general economic recovery.

The advance in wage rates effective July 16 restores the compensation of approximately 90 per cent in number of all employees to about 88 per cent of the rates paid between August, 1923, to October, 1931, and in the case of the unskilled labor receiving minimum rates of pay to the basic rate of 40c. an hour compared with the 44c. rate prevailing in 1929.

The foregoing advances will result in an increase in total payroll, based on the volume of employment prevailing in July, of somewhat in excess of $2,000,000 a month. The degree of employment in July is considerably larger than prevailed in June.

Cast Iron Pipe

New York has taken bids on 135 tons of pipe for Kings Park State hospital.

Cleveland will receive bids Aug. 3 for 24,000 tons of 24 in. to 48 in., and 1050 tons of pipe fittings for waterworks extensions.

Ferndale, Mich., plans about 12,500 ft. of 8 to 12-in. for extensions and improvements in municipal water system. J. F. Gibbs, city manager, in charge.

Bucyrus, Ohio, plans new pipe lines for main water trunk system and branch line service. Cost about $76,000.

Fond du Lac, Wis., will take bids about Aug. 1 on 7000 lin. ft. of 6, 8 and 12-in.

Edmond, Okla., is considering pipe line for extensions in municipal water supply. Entire project, with reservoir, to cost $35,000.

Eureka, Cal., plans about 27 miles of pipe for new municipal water system. C. C. Kennedy, 74 New Montgomery Street, San Francisco, is consulting engineer.

Alhambra, Cal., has awarded 246 tons of 18-in. to United States Pipe & Foundry Co.

Snohomish, Wash., is preparing bids for 4469 tons of 14 to 18-in.

Santa Monica, Cal., has taken bids on 167 tons of 6-in. class B.

Puyallup, Wash., has awarded 100 tons of 6 and 10-in. to American Cast Iron Pipe Co.

McNeil Island, Wash., has taken bids on 210 tons of 8, 10 and 18-in. for which Central Foundry Co. is low bidder.

Alderwood Manor, Wash., 1430 tons, water system, bids on cast iron and steel alternates under advisement.

Signal Hill, Cal., will take bids on Aug. 14 on 10,000 ft. of 6, 8 and 16-in.

Reinforcing Steel

Awards 9250 Tons—New Projects 3000 Tons

Boston, 140 tons, Crescent Brook sewer, to Kalman Steel Co.

Baltimore, 2400 tons, Pennsylvania Railroad Pier, to Concrete Steel Co., Philadelphia; previously reported placed with Kalman Steel Co.

Milwaukee, 200 tons, Schlitz brewery addition, to Inland Steel Co.

San Francisco, 4900 tons, west bay substructure on San Francisco-Oakland bridge, to Pacific Coast Steel Corpn.

San Francisco, 3800 tons, east bay substructure on San Francisco-Oakland bridge, to Pacific Coast Steel Corpn.

Los Angeles, 200 tons, Bullock's department store addition, to Soule Steel Co.

NEW REINFORCING BAR PROJECTS

Buffalo, 2200 tons, rail steel bars for storm sewer; bids in.

St. Louis, 150 tons, physics building at Washington University.

St. Louis, 300 tons, sewer project for Board of Public Service.

Salt Lake County, Utah, 100 tons, highway for Bureau of Public Roads; bids under advisement.

Panama Canal Zone, 230 tons, 1¼-in., mostly squares; bids July 27; schedule 2886.

Pipe Lines

Santa Rita Oil & Gas Co., Cut Bank, Mont., has let contract to Winton Construction Co., Minneapolis, for 4-in. welded steel pipe line from Cut Bank oilfields, Glacier County, Mont., to point on Northern Pacific Railroad, near Cut Bank, about 13 miles, with 3-in. steel gathering pipe lines, pumping plant, etc., for crude oil. Cost about $100,000.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Aug. 1 for 7600 ft. welded steel pipe, and 570 ft. lap-welded iron pipe (Schedule 414) for Mare Island Navy Yard.

Southern Carbon Co., Monroe, La., an interest of Columbian Carbon Co., 45 East Forty-second Street, New York, plans natural gas steel pipe line from gas properties near Ouchita City, La., to points in Union Parish, La. Project will cost close to $100,000, including certain well drilling and accessory work.

Colorado Springs, Colo., let contract to Hendrie & Bolthoff Mfg. & Supply Co., for steel and cast iron pipe, totaling $130,634, for municipal gas, electric and water utility pipe lines.

Denver, 2760 tons, 1-in. black steel tubing for Boulder Dam Spec. No. A-3262-A and B; bids under advisement.

... PERSONALS ...

FREDERICK S. BLACKALL, JR., has been elected president and treasurer of the Taft-Peirce Mfg. Co., Woonsocket, R. I., succeeding the late Gordon Gordon. JOHN W. WHEELER, JR., Bridgeport, has been made vice-president and WILLIAM A. GORDON, third, has become secretary. Mr. Blackall has been associated with the Taft-Peirce company since 1922, and has held various positions in the operating and executive departments, among them, foreman and metallurgist, branch office sales manager, assistant to the vice-president, and vice-president and general manager, having been appointed to the latter office in 1928. He was graduated from Yale University in 1918 and from the Massachusetts Institute of Technology in 1922. Mr. Blackall is a member of a number of technical societies and has been especially active in national standardization work. He continues as general manager of the company.

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L. W. GROTHAUS, who has served as general representative, in charge of the sales organization, of the Allis-Chalmers Mfg. Co., Milwaukee, has been appointed assistant to the president. His duties will consist in directing the company's interests in matters pertaining to the National Industrial Recovery Act as they relate to commercial problems. He became affiliated with the Allis-Chalmers organization in 1904 and has served the company continuously in various capacities since that time, except during the war period, when his services were loaned to the Government as a member of the staff of the War Industries Board. Mr. Grothaus was appointed general representative in January, 1932. WALTER GEIST, who has been made general representative, has been identified with the company since 1909, in the flour mill, saw mill and power transmission division. He has been assistant manager of the milling machinery department since 1928.

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COL. O. F. HARVEY since 1920 assistant secretary of the American Car & Foundry Co., New York, has been made vice-president.

"Labor Aiding" Is A Good Term

R. J. WEAN, of Wean Engineering Co., Inc., Warren, Ohio, has an idea which should be taken up by all makers of improved machinery. It is to use the term "labor aiding" instead of "labor saving." The latter expression has given the wrong impression that improved machinery decreases the number of jobs, whereas it has been conclusively proven that it aids labor by doing just the opposite.

—Editor.

GEN. THOMAS S. HAMMOND, president, Whiting Corpn., Harvey, Ill., and president, Illinois Manufacturers' Association, has resigned the latter position to assume an executive post under GEN. HUGH C. JOHNSON in connection with the administration of the National Recovery Act.

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A. J. JOHNSON, since 1930 assistant to the president of Hickman, Williams & Co., has been named president of the company succeeding T. C. Ward, who died late in June at Pittsburgh. Mr. Johnson is a native of Wisconsin and was graduated in 1913 in chemical engineering from the University of Wisconsin. He joined the Hickman, Williams organization in that year as a metallurgical salesman, with headquarters at Chicago. In 1919 he was appointed resident manager at Chicago and in 1929 he was made a vice-president of the company. He became assistant to the president in the following year.

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PAUL L. HAY, for the past twenty years prominent in the foundry equipment and mill machinery business in the Pittsburgh district, has been elected president of the Engineering Alumni Association of the University of Pittsburgh.

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CHARLES B. SMITH has resigned as president and member of the executive committee of the Stewart Warner Corpn. The position of the president will be left open for the present.

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JOHN T. HILL, for many years associated with the iron and steel business in Baltimore, sailed on July 19 for a stay of a month in England.

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THORNTON F. BRIGHT, until recently structural engineer, in charge of welding design and research, for the Western Gas Construction Co., Fort Wayne, Ind., has established himself as a consulting engineer in structural steel, plate fabrication and fusion welding, with headquarters in the Builders Building, Chicago.

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CLIFFORD F. MESSINGER, president, Chain Belt Co., Milwaukee, has been elected a member of the board of trustees, Northwestern Mutual Life Insurance Co., Milwaukee.

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A. J. SPEAR, director of personnel for the American Cast Iron Pipe Co., Birmingham, has been appointed Alabama director for the National Reemployment Service.

Alan Wood Steel Co., Conshohocken, Pa., announces the recent appointment of Henry A. Getty as New England representative with offices located at 250 Stuart Street, Consolidated Gas Building, Boston.

Fabricated Structural Steel

Awards Again Decline—New Projects Slightly Lower

LETTINGS of 6225 tons, mostly in small tonnages, compare with 7900 tons a week ago. No sizable award was reported. New projects of 8000 tons compare with 8550 tons in the previous week and 5900 tons two weeks ago. The largest new job is 5000 tons for the Westchester-Pelham viaduct near New York City, for which the Westchester County Park Commission is arranging financing. Plate awards account for 5800 tons. Structural steel lettings for the week follow:

STRUCTURAL STEEL AWARDS

NORTH ATLANTIC STATES

New York, 700 tons, Manhattan Refrigerating Co. warehouse, to Harris Structural Steel Co.

New York, 320 tons, Dey Street office building, to Ingalls Iron Works Co.

New York, 320 tons, twenty-third Street garage, to Lehigh Structural Steel Co.

Buffalo, 230 tons, repairs to Louisiana Street bridge, to R. S. McMannus Steel Construction Co., Buffalo, previously reported awarded to Lackawanna Steel Construction Co.

Buffalo, 300 tons, addition to Bank of Buffalo, to McClintic-Marshall Corpn.

Wassaic, N. Y., 423 tons, State school, to F. L. Heughes & Co., Rochester, N. Y.

Orangeburg, N. Y., 525 tons, Rockland County Hospital, to Bethlehem Fabricators, Inc.

Bayway, N. J., 540 tons, National Electric Products Corpn. building, to Savary-Glaeser Co.

Jersey City, N. J., 150 tons, National Grocery Co., railroad trestle, to McClintic-Marshall Corpn.

State of Pennsylvania, 160 tons, bridge on State highway route 708, to Jones & Laughlin Steel Corpn.

SOUTH AND SOUTHWEST

Louisville, Ky., 125 tons, power house for Fall City Ice & Beverage Co., to Jones & Laughlin Steel Corpn.

Phoenix, Ariz., 255 tons, Kress store, to McClintic-Marshall Corpn.

Midlothian, Okla., 325 tons, highway bridge, to Missouri Valley Bridge & Iron Co., Leavenworth, Kan.

Supply, Okla., 650 tons, highway bridge, to Pittsburgh-Des Moines Steel Co.

CENTRAL STATES

Painesdale, Mich., 200 tons, high school addition, to Wisconsin Bridge & Iron Co., Milwaukee.

Milwaukee, 150 tons, power house, to Hackendahl & Schmidt Co., Milwaukee.

Kankakee, Ill., 100 tons, factory to Wendnagel & Co., Chicago.

Cloquet, Minn., 100 tons, paper mill to Minneapolis Moline Power Implement Co.

WESTERN STATES

Seattle, 225 tons, vessel for Northland Transportation Co., to Berg Shipbuilding Co.

Los Angeles, 500 tons, Bullock's department store addition, to Consolidated Steel Corpn.

NEW STRUCTURAL STEEL PROJECTS

NORTH ATLANTIC STATES

Boston & Maine Railroad, 300 tons, bridge at Everett, Mass.

Brooklyn, 150 tons, Loew's Alpine Theater.

Brooklyn, 150 tons, coal handling plant.

Westchester County, N. Y., 5000 tons, Westchester-Pelham viaduct; financing being arranged by Westchester County Park Commission.

New York, 250 tons, building and rectory for St. Andrew's Roman Catholic church.

Mount Morris, N. Y., 800 tons, J. W. Cowper Co., Buffalo, low bidder.

Lebanon County, Pa., 150 tons, bridge for County Highway Commission, M. & J. B. McHugh, Philadelphia, low bidder on general contract.

Lebanon County, Pa., 135 tons, bridge for County Highway Commission, W. H. Drawbaugh, Dover, Pa., general contractor.

SOUTH AND SOUTHWEST

Yorktown, Va., 3500 tons, York River bridge, Independent Bridge Co., Pittsburgh, low bidder, financing being arranged.

State of Oklahoma, 400 tons, highway bridges.

CENTRAL STATES

State of Ohio, 730 tons, bridge over Great Miami River at Hamilton.

State of Illinois, 1500 tons, Manheim Road viaduct at Justice, new bids July 31.

Portsmouth, Ohio, 120 tons, post office, Algernon & Blair Co., contractor.

WESTERN STATES

Humphrey, Idaho, 430 tons, highway bridges at Humphrey and Eastport, for Bureau of Public Roads.

State of Utah, 322 tons, highway for Bureau of Public Roads, bids Aug. 3.

El Monte, Cal., 160 tons, Southern Pacific Railroad subway, bids under advisement.

San Francisco, 400 tons, cell equipment for County jail, Judson-Pacific Co., low bidder.

FABRICATED PLATE

AWARDS

New York, 768 tons, tanks for Richfield Oil Co., to Graver Tank & Mfg. Corpn.

Philadelphia, 210 tons, tanks for American Commercial Alcohol Corpn., to Chicago Bridge & Iron Works.

Pittsburgh, 800 tons, five sand barges for McCready-Rodgers Co., to American Bridge Co.

Wheeling, W. Va., 460 tons, three coal barges for Costanzo Transportation Co., to American Bridge Co.

Gauley Junction, W. Va., 1270 tons, New Kanawha Power Co., Penstock, to Babcock & Wilcox Co.

Wilmington, N. C., 370 tons, oil tanks for Texas Co., to McClintic-Marshall Corpn.

Logansport, Ind., 218 tons, tanks for M. K. Schmidt Grain Co., to Graver Tank & Mfg. Corpn.

Chicago, 130 tons, stacks for Inland Steel Co., to Graver Tank & Mfg. Corpn.

East Chicago, Ind., 193 tons, tanks for miscellaneous companies to Graver Tank & Mfg. Corpn.

St. Louis, 500 to 600 tons, 200 tanks for Hyde Park Brewery to St. Louis Structural Steel Co., East St. Louis, Ill.

Seattle, 575 tons, vessel for Northland Transportation Co., to Berg Shipbuilding Co.

NEW PROJECTS

Cleveland, 2500 tons, welded steel pipe for waterworks extension; bids Aug. 3.

Chicago, 165 tons, barge for city waterworks department; Dravo Contracting Co., low bidder.

Valley Steel Production Sustained at 65 Per Cent; Pig Iron Output Increasing

YOUNGSTOWN, July 25.—With steel-making operations well sustained and specifications only beginning to run behind corresponding June levels, Valley steel producers are moderately hopeful that seasonally depressing influences may be avoided this year. Ingot production is well sustained in the Valleys and nearby northern Ohio mills at approximately 65 per cent of capacity, and some producers have sufficient heats scheduled to maintain this level for at least two weeks. During the past week three large plants in the district, with 15, 12 and eight open-hearth furnaces, respectively, operated all these units for at least one day, although this capacity rate was not sustained for any considerable period. Bessemer capacity is engaged at a higher rate than open-hearth furnaces, largely because of the increased requirements of pipe mills.

A Steel Corporation blast furnace was blown in last week, and two independent units are scheduled to resume this week. The Republic Steel Corpn. will then have all of its stacks in Youngstown, Warren, Canton and Massillon, Ohio, in production, and in the immediate Valley district 16 of 31 available furnaces will be running.

Finished steel demand is featured by continued activity in the pipe market. With tin mills at capacity on the basis of a maximum of 16 turns, and sheet and strip production sustained at about 60 per cent, production of pipe alone continues to show improvement. Oil country goods are affected least, although line pipe continues very quiet. Standard butt-weld material, on the other hand, has met with an unusually strong demand in the last two weeks.

Makers of steel mill machinery and equipment in the district report unusually heavy orders in the last month.

The raw material markets have been featured by a sharp increase in scrap prices, No. 1 heavy melting steel having been bought by two consumers at $13.75. This represents an advance of more than $1 a ton over recent levels, and the reluctance of dealers to take orders indicates higher prices in the near future.

Metals Sensitive to Wall Street Break

Copper Sales Moderate at Strong 9c. Level—Light Tin Purchases Reappear—Lead and Zinc Inactive

NEW YORK, July 25.—Developments in the securities markets have resulted in a sharp letdown in consumer demand for electrolytic copper. The market developed a strong tone last Wednesday, and quotations were tentatively raised to 9.25c., but the psychological effect of a Wall Street decline rapidly forced quotations back to a 9c. level. Sellers are covering their regular trade at 9c. a lb., delivered Connecticut points, but are avoiding heavy commitments in expectation of a recurrence of market strength. Releases to fabricators continue satisfactory, and in several cases buyers are anticipating requirements. About 400 tons of metal were sold last week at 8.50c. for payment by Aug. 10. In addition, several "outsiders" booked moderate tonnages at 8.75c. a lb. for futures through October, but such action failed to reduce general market values. Foreign offerings started the seven-day period strongly at 9.12½c. a lb., c.i.f. usual Continental ports, but values broke sharply and dealings were made today at 8.62½c. to 8.75c. a lb. Sales to foreign consumers and dealers have declined and current inquiry is negligible. Unsettled demand in Europe and a beclouded price situation is helping to stifle buying interest in this country.

Tin

Domestic consumers have lately avoided active participation in the tin market, but several consumers reentered this week to take small tonnages of Straits and English refined. Large buyers, however, continue rather chary in light of Wall Street weakness and exchange irregularities. Quotations opened nominally at 47.25c. last Wednesday, eased off to 45.87½c. yesterday, only to climb back to 46.87½c. a lb. this afternoon on advances in sterling. London prices have held firm, so domestic fluctuations were wholly dependent upon sterling changes. Current inquiry is negligible, and purchases are in small lots to cover spot needs. Large consumers are well covered for August, and probably will await more normal conditions before covering for future requirements. English refined is receiving more interest, with a differential currently established at ⅝c. a lb. General consumer interest is lacking in Europe, and market strength there is attributable to American activity. Backwardation disappeared in London early this week, and offerings were made today at £215 15s. for spot standard, £215 15s. for future standard and £220 5s. a ton for spot Straits. The Singapore quotation advanced £3 to a current level of £220 15s. Straits shipments into American consumption as of July 22 totaled 3941 tons. United Kingdom stocks dropped 300 tons during the week and now stand at 20,188 tons.

Lead

Consumer interest eased off sharply last Thursday when commodity and securities exchange values plunged to a low level. Quotations are unchanged and firm at 4.50c., New York, and 4.35c. a lb., St. Louis. Current inquiry is light but releases are in heavy volume, and smelters expect July deliveries to exceed those of June, which were the largest for the year. Large consumers have made heavy commitments, and producers expect no immediate return of active purchasing. A refined stock decrease of 4000 tons during June was unique, and smelters consider the statistical position of lead greatly improved. Demand from the ultimate consumer occasioned the stock decrease, since production has remained at a steady level. American values continue to be depressed by the weak tone of the London market.

Zinc

Selling pressure on Prime Western, which developed early in July, eased off considerably during the past seven-day period. Offerings are firm at 5c., East St. Louis, or 5.37c. a lb., New York, for deliveries through September and into October. The ore situation has eased up and miners are releasing considerable tonnages at $35. The Joplin market was on the verge of advancing $2.50 to $5 a ton, but action stopped suddenly when stock and commodities prices dropped. Shipments are in excellent volume. Open demand is moderate, since consumers are well covered for immediate needs. Nevertheless, smelters are covering regular buyers at current price levels quietly in order to retain market stability. Joplin ore production totaled 5000 tons last week against sales of 6150 tons, which amply supplied smelters' current requirements. Shipments were 5700 tons, and stocks were estimated at 14,700 tons at the end of the week.

The Week's Prices. Cents Per Pound for Early Delivery

	July 19	July 20	July 21	July 22	July 24	July 25
Electrolytic copper, N. Y.*	8.75	8.75	8.75	8.75	8.75	8.75
Lake copper, New York	9.00	9.00	9.00	9.00	9.00	9.00
Straits tin, Spot, N. Y.	47.25	46.00	46.00	....	45.87½	46.87½
Zinc, East St. Louis	5.00	5.00	4.90	4.90	5.00	5.00
Zinc, New York	5.37	5.37	5.27	5.27	5.37	5.37
Lead, St. Louis	4.35	4.35	4.35	4.35	4.35	4.35
Lead, New York	4.50	4.50	4.50	4.50	4.50	4.50

*Refinery quotations; price ¼c. higher delivered in Connecticut.

Aluminum, 98 to 99 per cent pure, 22.90c. a lb., delivered.
Nickel electrolytic cathode, 35c. a lb., delivered; shot and ingot, 36c. a lb., delivered.
Antimony, 7.50c. a lb., New York.
Brass ingots, 85-5-5-5, 9c. a lb., New York and Philadelphia.

From New York Warehouse

Delivered Prices, Base per Lb.

Tin, Straits pig	49.00c. to 50.00c.
Tin, bar	51.00c. to 52.00c.
Copper, Lake	10.50c. to 11.25c.
Copper, electrolytic	10.25c. to 10.75c.
Copper, castings	10.00c. to 11.00c.
*Copper sheets, hot-rolled	15.62½c.
*High brass sheets	14.25c.
*Seamless brass tubes	15.87½c.
*Seamless copper tubes	16.12½c.
*Brass rods	11.75c.
Zinc, slabs	6.25c to 7.25c.
Zinc sheets (No. 9), casks	9.75c. to 10.00c.
Lead, American pig	5.50c. to 6.50c.
Lead, bar	7.00c. to 8.00c.
Lead, sheets	8.25c.
Antimony, Asiatic	8.50c. to 9.50c.
Alum., virgin, 99 per cent plus	23.30c.
Alum. No. 1 for remelting, 98 to 99 per cent	18.00c. to 19.00c.
Solder, ½ and ½	30.50c. to 31.50c.
Babbitt metal commerical grade	27.00c. to 52.00c.

*These prices are also for delivery from Chicago and Cleveland warehouses.

From Cleveland Warehouse

Delivered Prices per Lb.

Tin, Straits pig	49.50c.
Tin, bar	51.50c.
Copper, Lake	10.25c.
Copper, electrolytic	10.25c.
Copper, casting	10.00c.
Zinc, slab	5.75c. to 6.00c.
Lead, American pig	5.35½c. to 5.50c.
Lead, bar	8.50c.
Antimony, Asiatic	8.50c.
Babbitt metal, medium grade	19.00c.
Babbitt metal, high grade	53.50c.
Solder, ½ and ½	27.50c.

Old Metals, Per Lb., New York

Buying prices are paid by dealers for miscellaneous lots from smaller accumulators, and selling prices are those charged to consumers after the metal has been prepared for their uses. (All prices are nominal.)

	Dealers' Buying Prices	Dealers' Selling Prices
Copper, hvy. crucible	7.25c.	8.00c.
Copper, hvy. and wire	7.25c.	8.00c.
Copper, light and bottoms	6.00c.	6.75c.
Brass, heavy	4.00c.	4.75c.
Brass, light	3.50c.	4.00c.
Hvy. machine composition	5.75c.	6.25c.
No. 1 yel. brass turnings	5.00c.	5.625c.
No. 1 red brass or compos. turnings	5.25c.	5.875c.
Lead, heavy	3.625c.	4.00c.
Zinc	2.75c.	3.25c.
Cast aluminum	7.50c.	8.75c.
Sheet aluminum	12.00c.	13.50c.

Prices of Finished and Semi-Finished Steel, Coke, Coal, Cast Iron Pipe

BARS, PLATES, SHAPES

Iron and Steel Bars

Soft Steel

	Base per Lb.
F.o.b. Pittsburgh mill	1.60c.
F.o.b. Chicago	1.70c.
Del'd Philadelphia	1.91c.
Del'd New York	1.95c.
Del'd Detroit	1.80c.
F.o.b. Cleveland	1.65c.
F.o.b. Lackawanna	1.70c.
F.o.b. Birmingham	1.75c.
C.i.f. Pacific ports	2.10c.

Billet Steel Reinforcing

(Cut lengths as quoted by distributers)

F.o.b. P'gh mills	1.75c.
F.o.b. Birmingham	1.75c.
F.o.b. Cleveland	1.75c. to 1.90c.

Rail Steel

F.o.b. mills, east of Chicago dist.	1.50c.
F.o.b. Chicago Heights mills	1.50c.

Iron

Common iron, f.o.b. Chicago	1.60c.
Refined iron, f.o.b. P'gh mills	2.75c.
Common iron, del'd Philadelphia	1.86c.
Common iron, del'd New York	1.90c.

Tank Plates

	Base per Lb.
F.o.b. Pittsburgh mill	1.60c.
F.o.b. Chicago	1.70c.
F.o.b. Birmingham	1.75c.
Del'd Cleveland	1.8035c.
Del'd Philadelphia	1.4935c. to 1.5935c.
F.o.b. Coatesville	1.40c. to 1.50c.
F.o.b. Sparrows Point	1.40c. to 1.50c.
Del'd New York	1.598c. to 1.698c.
C.i.f. Pacific ports	2.10c.
Wrought iron plates, f.o.b. P'gh	3.00c.

Structural Shapes

	Base per Lb.
F.o.b. Pittsburgh mill	1.60c.
F.o.b. Chicago	1.70c.
F.o.b. Birmingham	1.75c.
F.o.b. Lackawanna	1.70c.
F.o.b. Bethlehem	1.70c.
Del'd Cleveland	1.8035c.
Del'd Philadelphia	1.7495c.
Del'd New York	1.86775c.
C.i.f. Pacific ports (standard)	2.10c.
C.i.f. Pacific ports (wide flange)	2.20c.

Steel Sheet Piling

	Base per Lb.
F.o.b. Pittsburgh	1.90c.
F.o.b. Chicago mill	2.05c.
F.o.b. Buffalo	2.00c.

Alloy Steel Bars

(F.o.b. Pittsburgh, Chicago, Buffalo, Massillon or Canton.)

Alloy Quantity Bar Base, 2.45c. to 2.65c. per Lb.

S.A.E. Series Numbers	Alloy Differential per 100 Lb.
2000 (1¼% Nickel)	$0.25
2100 (2½% Nickel)	0.55
2300 (3½% Nickel)	1.50
2500 (5% Nickel)	2.25
3100 Nickel Chromium	0.55
3200 Nickel Chromium	1.35
3300 Nickel Chromium	3.80
3400 Nickel Chromium	3.20
4100 Chromium Molybdenum (0.16 to 0.25 Molybdenum)	0.50
4100 Chromium Molybdenum (0.25 to 0.40 Molybdenum)	0.70
4600 Nickel Molybdenum (0.20 to 0.30 Molybdenum). (1.50 to 2.00 Nickel)	1.05
5100 Chromium Steel (0.60 to 0.90 Chromium)	0.35
5100 Chromium Steel (0.80 to 1.10 Chromium)	0.45
5100 Chromium Spring Steel	0.20
6100 Chromium Vanadium Bar	1.20
4100 Chromium Vanadium Spring Steel	0.95
9250 Silicon Manganese Spring Steel (flats)	0.25
Rounds and Square	0.50
Chromium Nickel Vanadium	1.50
Carbon Vanadium	0.95

Above prices are for hot-rolled steel bars forging quality. The differential for cold-drawn bars is ¾c. a lb. higher, with standard classification for cold-finish alloy steel bars applying. For billets 4 x 4 to 10 x 10 in., the price for a gross ton is the net price for bars of the same analysis.

Billets under 4 x 4 in. carry the steel bar base. Slabs with a section area of 16 in. or over carry the billet price. Slabs with sectional area of less than 16 in. or less than 2¼ in. thick, regardless of sectional area, take the bar price.

Cold Finished Bars*

Bars, f.o.b. Pittsburgh Mill	1.70c.
Bars, f.o.b. Chicago	1.75c.
Bars, Cleveland	1.75c.
Bars, Buffalo	1.75c.
Bars, Detroit	1.90c.
Bars, eastern Michigan	1.95c.
Shafting, ground, f.o.b. mill, 1¼ in.	3.00c.
1-3/16 to 1¼ in.	2.50c.
1-9/16 to 1¾ in.	2.35c.
1-15/16 to 2¾ in.	2.20c.
2-15/16 to 6 in.	2.05c.

* In quantities of 10,000 to 19,999 lb.

SHEETS, STRIP, TIN PLATE TERNE PLATE

Sheets

Hot-Rolled

No. 10, f.o.b. Pittsburgh	1.65c.
No. 10, f.o.b. Chicago mill	1.75c.
No. 10, del'd Philadelphia	1.96c.
No. 10, f.o.b. Birmingham	1.80c.
No. 10, c.i.f. Pacific Coast ports	2.27½c.

Hot-Rolled Annealed

No. 24, f.o.b. Pittsburgh	2.25c.
No. 24, f.o.b. Chicago mills	2.35c.
No. 24, del'd Philadelphia	2.56c.
No. 24, f.o.b. Birmingham	2.40c.
No. 24, c.i.f. Pacific Coast ports	2.90c.
No. 24, wrought iron, Pittsburgh	4.30c.

Heavy Cold-Rolled (Mill Run)

No. 10 gage, f.o.b. Pitts'h	1.95c.
No. 10 gage, f.o.b. Chicago mills	2.05c.
No. 10 gage, del'd Phila.	2.26c.
No. 10 gage, del'd Pacific Coast ports	2.70c.

Light Cold-Rolled (Mill Run)

No. 20 gage, f.o.b. Pitts'h	2.40c.
No. 20 gage, f.o.b. Chicago mills	2.50c.
No. 20 gage, del'd Phila.	2.56c.
No. 20 gage, del'd Pacific Coast ports	2.95c.

Auto Body and Steel Furniture

No. 10, f.o.b. Pittsburgh	2.15c.
No. 20 f.o.b. Pittsburgh	2.60c.
No. 20, f.o.b. Chicago	2.70c.

Galvanized Sheets

No. 24, f.o.b. Pittsburgh	2.85c.
No. 24, f.o.b. Chicago mills	2.95c.
No. 24, del'd Philadelphia	3.18c.
No. 24, f.o.b. Birmingham	3.00c.
No. 24, c.i.f. Pacific Coast ports	3.50c.
No. 24, wrought iron, Pittsburgh	4.95c.

Long Terne

No. 24, unassorted, 8-lb. coating f.o.b. Pittsburgh	2.90c.

Vitreous Enameling Stock

No. 20, f.o.b. Pittsburgh	2.90c.

Tin Mill Black Plate

No. 28, f.o.b. Pittsburgh	2.50c.
No. 28, Chicago mill	2.60c.

Tin Plate

	Base per Box
Standard cokes, f.o.b. P'gh district mill	$4.25
Standard cokes, f.o.b. Gary	4.35

Terne Plate

(*F.o.b. Morgantown or Pittsburgh*)
(Per Package, 20 x 28 in.)

8 lb. coating I.C.	$8.70
15-lb. coating I.C.	11.00
20-lb. coating I.C.	11.90
25-lb. coating I.C.	13.00
30-lb. coating I.C.	12.80
40-lb. coating I.C.	15.30

Hot-Rolled Hoops, Bands, Strips and Flats under ¼ In.

	Base per Lb.
All widths up to 24 in., Pittsburgh	1.60c. to 1.65c.
All widths up to 24 in., Chicago	1.70c. to 1.75c.
Cooperage stock, P'gh	1.70c. to 1.75c.
Cooperage stock, Chicago	1.80c. to 1.85c.

Cold-Rolled Strips

F.o.b. Pittsburgh	2.25c.
F.o.b. Cleveland	2.25c.
Del'd Chicago	2.55c.
F.o.b. Worcester	2.45c.
Fender stock, No. 20 gage, Pittsburgh or Cleveland	2.85c.

WIRE PRODUCTS

(Carload lots, f.o.b. Pittsburgh and Cleveland.)

To Manufacturing Trade

	Per Lb.
Bright wire	2.10c.
Spring wire	3.10c.

To Jobbing Trade

Extras of 10c. a 100 lb. on mixed carloads, 20c. on joint carloads and 30c. on pooled cars and less-than-carload lots are applied on all merchant wire products. In carloads and mixed carloads a discount of 10 per cent on extras is allowed.

	Base per Keg
Standard wire nails	$2.10
Smooth coated nails	2.10
Galvanized nails	3.60

	Base per 100 Lb.
Smooth annealed wire	$2.25
Smooth galvanized wire	2.60
Polished staples	2.80
Galvanized staples	3.05
Barbed wire, galvanized	2.60
Woven wire fence, base column	$55.00

Chicago and Anderson, Ind., mill prices are $1 a ton over Pittsburgh base (on all products except woven wire fence, for which the Chicago price is $2 above Pittsburgh); Duluth, Minn., and Worcester, Mass., mill prices are $2 a ton over Pittsburgh (except for woven wire fence at Duluth which is $3 over Pittsburgh), and Birmingham mill prices are $3 a ton over Pittsburgh.

STEEL AND WROUGHT PIPE AND TUBING

Welded Pipe

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio Mills

Butt Weld

Steel Inches	Steel Black	Steel Galv.	Wrought Iron Inches	Wrought Iron Black	Wrought Iron Galv.
⅛	51½	29½	⅛	+91½	+138
¼ to ⅜	57	38½	¼ & ⅜	+1½	+21½
½	62	50½	½	31½	15
⅝	65½	55½	¾	36½	20½
1 to 3	67½	58½	1&1¼	39½	25½
			1½	43½	28
			2	41½	26

Lap Weld

2	63½	54½	2	37	22½
2½ to 3	65½	57½	2½ to 3½	38	25
3½ to 6	68½	59½	4 to 8	40	28½
7 and 8	57½	57	9 to 12	38	24½
9 and 10	67	57			
11 and 12	66	56			

Butt Weld, extra strong, plain ends

⅛	38½	33½	⅛	+13	+45½
¼ to ⅜	54½	41½	¼ & ⅜	+2½	+34½
½	60	51	½	32½	17½
¾	64½	55½	¾	37½	22½
1 to 3	66½	58½	1 to 2	43½	29

Lap Weld, extra strong, plain ends

2	61½	53½	2	40	26
2½ to 3	65½	57½	2½ to 4	45½	33
3½ to 6	69	61	4½ to 6	45	32½
7 to 8	68	58	7 & 8	46	33
9 to 12	67	57	9 to 12	41½	30
11 and 12	66	56			

Discounts on steel and wrought iron pipe are net and not subject to any points or preferentials.

Note—Chicago district mills have a base two points less than the above discounts. Chicago delivered base is 2½ points less. Freight is figured from Pittsburgh, Lorain, Ohio, and Chicago district mills, the billing being from the point producing the lowest price to destination.

Boiler Tubes

Base Discounts, f.o.b. Pittsburgh

Steel		Charcoal Iron	
2 in. and 2¼ in.	33	1½ in.	1
2½ in.—2¾ in.	40	1¾ in.	8
3 in.	47	2 in.—2¼ in.	13
3½ in.—4¼ in.	50	2½ in.—2¾ in.	16
4 in.	52	3 in.	17
4½ in. to 6 in	42	3¼ in. to 3½ in.	18
		4 in.	20
		4½ in.	21

On lots of a carload or more, the above base discounts are subject to a preferential of two fives on steel and of 10 per cent on charcoal iron tubes. Smaller quantities are subject to the following modifications from the base discounts:

Lap welded Steel—Under 10,000 lb., 6 points under base and one five; 10,000 lb. to carload 4 points under base and two fives. Charcoal Iron—Under 10,000 lb., 2 points under base; 10,000 lb. to carload, base and one five.

Standard Commercial Seamless Boiler Tubes

Cold-Drawn

1 in.	61	3 in.	41
1¼ to 1½ in.	53	3¼ to 3½ in.	44
1¾ in.	37	4 in.	46
2 to 2¼ in.	27	4½, 5 and 6 in.	36
2½ to 2¾ in.	34		

Hot Rolled

2 and 2¼ in.	33	3¼ to 3½ in.	50
2½ and 2¾ in.	40	4 in.	52
3 in.	47	4½, 5 and 6 in.	42

Beyond the above base discounts a preferential discount of 5 per cent is allowed on carload lots. On less than carloads to 10,000 lb. base discounts are reduced 4 points with 5 per cent preferential; on less than 10,000 lb., base discounts are reduced 6 points with no preferential. No extra for lengths up to and including 24 ft. Sizes smaller than 1 in. in lighter than standard gages take the mechanical tube list and discounts. Intermediate sizes and gages not listed take price of next larger outside diameter and heavier gage.

Seamless Mechanical Tubing

	Per Cent Off List
Carbon, 0.10% to 0.30% base (carloads)	55
Carbon, 0.30% to 40% base	50

Plus differential for lengths over 18 ft. and for commercial exact lengths. Warehouse discounts on small lots are less than the above.

RAILS AND TRACK SUPPLIES

Rails

	Per Gross Ton
Standard, f.o.b. mill	$40.00
Light (from billets), f.o.b. mill	30.00
Light (from rail steel), f.o.b. mill	26.00

Track Equipment

	Base per 100 Lb.
Spikes, 9/16 in. and larger	$2.40
Spikes, ½-in. and smaller	2.40
Spikes, boat and barge	2.60
Tie plates, steel	1.75 to 1.90
Angle bars	2.55
Track bolts, to steam railroads	3.50
Track bolts, to jobbers, all sizes, (per 100 count)	73 per cent off list

BOLTS, NUTS, RIVETS AND SET SCREWS

Bolts and Nuts

(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

	Per Cent Off List
Machine bolts	73
Carriage bolts	73
Lag bolts	73
Plow bolts, Nos. 1, 2, 3 and 7 heads	73
Hot-pressed nuts, blank or tapped, square	73
Hot-pressed nuts, blank or tapped, hexagons	73
C.p.c. and t. square or hex nuts, blank or tapped	73
Semi-finished hexagon nuts	73
Semi-finished hexagon castellated nuts, S.A.E.	73
Stove bolts in packages, P'gh, 7½, 25 and 10	
Stove bolts in packages, Ch'go, 25 and 10	
Stove bolts in packages, Cleveland, 72½, 25 and 10	
Stove bolts in bulk, P'gh	85
Stove bolts in bulk, Chicago	85
Stove bolts in bulk, Cleveland	85
Tire bolts	60

Large Rivets

(½-in. and larger)

	Base per 100 Lb.
F.o.b. Pittsburgh or Cleveland	$2.50
F.o.b. Chicago	2.60

Small Rivets

(7/16-in. and smaller)

	Per Cent Off List
F.o.b. Pittsburgh	70, 10 and 5
F.o.b. Cleveland	70, 10 and 5
F.o.b. Chi'go and Birm'g'm	70, 10 and 5

Cap and Set Screws

(Freight allowed up to but not exceeding 65c. per 100 lb. on lots of 200 lb. or more)

	Per Cent Off List
Milled cap screws, 1 in. dia. and smaller	85
Milled standard set screws, case hardened, 1 in. dia. and smaller	80
Milled headless set screws, cut thread ¾ in. and smaller	75 and 10
Upset hex. head cap screws, U.S.S.S or S.A.E. thread, 1 in. dia. and smaller	85 and 10
Upset set screws, sq. head	80
Milled studs	70

SEMI-FINISHED STEEL

Billets and Blooms

	Per Gross Ton
Rerolling, 4-in. to 6-in. inclusive Pittsburgh	$26.00
Rerolling, 4-in. to 6-in. inclusive Youngstown	26.00
Rerolling, 4-in. to 6-in. inclusive Cleveland	26.00
Rerolling, 4-in. to 6-in. inclusive Chicago	26.00
Forging quality, Pittsburgh	31.00
Forging quality, Youngstown	31.00

Sheet Bars

(Open-Hearth or Bessemer)

	Per Gross Ton
Pittsburgh	$26.00
Youngstown	26.00
Cleveland	26.00

Slabs

(8 in. x 2 in. and under 10 in. x 10 in.)

	Per Gross Ton
Pittsburgh	$26.00
Youngstown	26.00
Cleveland	26.00

Skelp

(F.o.b. Pittsburgh or Youngstown)

	Per Lb.
Grooved	1.60c.
Universal	1.60c.
Sheared	1.60c.

Wire Rods

(Common soft, base)

	Per Gross Ton
Pittsburgh	$35.00
Cleveland	35.00
Chicago	36.00

COKE, COAL AND FUEL OIL

Coke

	Per Net Ton
Furnace, f.o.b. Connellsville	
Prompt	$2.50 to $3.50
Foundry, f.o.b. Connellsville	
Prompt	3.00 to 4.00
Foundry, by-product, Chicago ovens, for delivery outside switching districts	7.50
Foundry, by-product, delivered in Chicago switching district	8.25
Foundry, by-product, New England, delivered	10.00
Foundry, by-product, Newark or Jersey City, del'd	8.20 to 8.81
Foundry, by-product, Phila.	8.50
Foundry, by-product, Cleveland, delivered	8.26
Foundry, Birmingham	5.00
Foundry, by-product, St. Louis, f.o.b ovens	8.00
Foundry, by-product, del'd St. Louis	9.00

Coal

	Per Net Ton
Mine run steam coal, f.o.b. W. Pa. mines	$1.10 to $1.20
Mine run coking coal f.o.b. W. Pa.	1.40 to 1.50
Gas coal, ¾-in., f.o.b. Pa. mines	1.30 to 1.40
Mine run gas coal, f.o.b. Pa. mines	1.30 to 1.40
Steam slack, f.o.b. W. Pa. mines	0.45 to 0.55
Gas slack, f.o.b. W. Pa. mines	0.65 to 0.75

Fuel Oil

Per Gal. f.o.b. Bayonne, N. J.	
No. 3 distillate	4.00c.
No. 4 industrial	3.50c.
Per Gal. f.o.b. Baltimore	
No. 3 distillate	4.00c.
No. 4 industrial	3.50c.
Per Gal. del'd Chicago	
No. 3 industrial fuel oil	3.73c.
No. 5 industrial fuel oil	3.23c.
Per Gal. f.o.b. Cleveland	
No. 3 distillate	5.25c.
No. 4 industrial	5.00c.

REFRACTORIES

Fire Clay Brick

	Per 1000 f.o.b. Works: High-heat Duty Brick	Intermediate Duty Brick
Pennsylvania	$40.00	$35.00
Maryland	40.00	35.00
New Jersey	50.00	38.00
Ohio	40.00	35.00
Kentucky	40.00	35.00
Missouri	40.00	35.00
Illinois	40.00	35.00
Ground fire clay, per ton	7.00	

Chrome Brick

	Per Net Ton
Standard size	$45.00

Silica Brick

	Per 1000 f.o.b. Works
Pennsylvania	$40.00
Chicago	49.00
Birmingham	50.00
Silica clay, per ton	8.00

Magnesite Brick

	Per Net Ton
Standard sizes, burned, f.o.b. Baltimore and Chester, Pa.	$65.00
Unburned, f.o.b. Baltimore	52.00
Grain magnesite, f.o.b. Baltimore and Chester, Pa.	40.00
Domestic, f.o.b. Chewelah, Wash.	22.00

CAST IRON PIPE

	Per Net Ton
6-in. and larger, del'd Chicago	$43.40 to $44.40
4-in., del'd Chicago	46.40 to 47.40
6-in., and larger, del'd New York	38.30
4-in., del'd New York	41.30
6-in., and larger, Birmingham,	$35.00 to 36.00
4-in., Birmingham	38.00 to 39.00

Class "A" and gas pipe, $3 extra.

Pig Iron, Ores, Ferroalloys

VALLEY

Per Gross ton f.o.b. Valley furnace:

Basic	$16.00
Bessemer	17.00
Gray forge	16.50
No. 2 foundry	16.50
No. 3 foundry	16.00
Malleable	16.50
Low phos., copper free	25.00

Freight rate to Pittsburgh or Cleveland district, $1.89.

PITTSBURGH

Per gross ton, f.o.b. Pittsburgh district furnace:

Basic	$16.50
No. 2 foundry	17.00
No. 3 foundry	16.50
Malleable	17.00
Bessemer	17.50

Freight rates to points in Pittsburgh district range from 69c. to $1.26.

CHICAGO

Per gross ton at Chicago furnaces:

N'th'n No. 2 fdy.	$17.00
N'th'n No. 1 fdy.	17.50
Malleable, not over 2.25 sil.	17.00
High phosphorus	17.00
Lake Super. charcoal, sil. 1.50, by rail	23.17
Southern No. 2 fdy.	$16.14 to 17.14
Low. phos., sil. 1 to 2, Copper free.	25.00
Silvery, sil. 8 per cent	24.92
Bess. ferrosil'n, 15 per cent	28.92

Prices are delivered consumers' yards except on Northern foundry, high phosphorous and malleable, which are f.o.b. local furnaces, not including a switching charge.

ST. LOUIS

Per gross ton at St. Louis:

No. 2 fdy., sil. 1.75 to 2.25, f.o.b. Granite City, Ill.	$17.00
Del'd St. Louis	17.85
Malleable, f.o.b. Granite City	17.50
Southern fdy., sil. 1.75 to 2.25 del'd St. Louis	17.35

Freight rates, 83c (average) Granite City to St. Louis; $2.30 from Chicago; $4.56 from Birmingham.

NEW YORK

Per Gross ton, delivered New York district:

*Buffalo, No. 2, del'v'd eastern N. J.	$18.41 to $18.91
*Buffalo malleable, del'v'd eastern N. J.	18.91 to 19.41
East Pa. No. 2 fdy. del'v'd eastern N. J.	18.02 to 18.52

Freight rates: $1.52 to $2.63 from eastern Pennsylvania.

*Prices delivered to New Jersey cities having rate of $3.41 a ton from Buffalo.

BUFFALO

Per gross ton, f.o.b. furnace:

*No 2 fdy.	$17.00
Malleable, sil. up to 2.25	17.50
Basic	15.00
Lake Superior charcoal, del'd	23.41

*Each increase of 25 points of silicon above base foundry grade takes 25c. extra.

CINCINNATI

Per gross ton, delivered Cincinnati:

Ala. fdy., sil. 1.75 to 2.25	$17.61
Tenn. fdy., sil. 1.75 to 2.25	17.61
N'th'n No. 2 foundry	$18.01 to 19.40
S'th'n Ohio silvery, 8%	21.39

Freight rates, $1.89 from Ironton and Jackson, Ohio; $3.82 from Birmingham.

CLEVELAND

Per gross ton at Cleveland furnace:

N'th'n No. 2 fdy.	$16.50
Malleable	16.50
Ohio silvery, 8 per cent	24.00
Stand. low. phos., Valley	25.00
Southern No. 2 fdy.	17.14

Prices are f.o.b. furnace except on Southern foundry and silvery iron. Freight rates; 63c. average local switching charge; $3.00 from Jackson, Ohio; $6.14 from Birmingham.

PHILADELPHIA

Per gross ton at Philadelphia:

*East. Pa. No. 2	$17.34
Basic (del'd east Pa.)	17.09
Malleable	17.84
Stand. low phos. (f.o.b. east. Pa. furnace)	$22.00 to $23.00
Con. b'r'g low phos. (f.o.b. furnace)	22.00 to 23.00
Va. No. 2	21.79
Va. No. 2X	22.29

Prices, except as specified otherwise, are del'd Philadelphia. Freight rates: 84c. to $1.79 from eastern Pennsylvania furnaces; $4.67 from Virginia furnaces.

*Each increase of 25 points of silicon above base grade takes 25c. extra.

BIRMINGHAM

Per gross ton, f.o.b. Birmingham dist. furnace:

No. 2 fdy., 1.75 to 2.25 sil.	$13.00
Basic	13.00

NEW ENGLAND

Per gross ton delivered Boston and nearby New England points:

Mystic, sil. 1.75 to 2.25	$18.50
Buffalo, sil. 1.75 to 2.25	18.50
Ala., sil. 1.75 to 2.25	18.00

CANADA

Per gross ton:

Delivered Toronto	
No. 1 fdy., sil. 2.25 to 2.75	$21.00
No. 2 fdy., sil. 1.75 to 2.75	20.50
Malleable	21.00
Delivered Montreal	
No. 1 fdy., sil. 2.25 to 2.75	$22.50
No. 2 fdy., sil. 1.75 to 2.25	22.00
Malleable	22.50
Basic	22.00

Ferromanganese

	Per Gross Ton
Domestic, 80%, seaboard, (carloads)	$82.00
Domestic, 80%, seaboard, (less carloads)	89.00

Spiegeleisen

	Per Gross Ton Furnace
Domestic, 19 to 21%	$27.00

Electric Ferrosilicon

	Per Gross Ton Delivered
50% (carloads)	$74.50
50% (less carloads)	82.00
75% (carloads)	120.00
75% (less carloads)	130.00
14% to 16% (f.o.b.) Welland, Ont. (in carloads)	31.00
14% to 16% (less carloads)	36.00

Silvery Iron

F.o.b. Jackson County, Ohio, or Pittsburgh Furnace

Per Gross Ton		Per Gross Ton	
6%	$20.00	12%	$23.50
7%	20.50	13%	24.00
8%	21.00	14%	24.50
9%	21.50	15%	25.00
10%	22.00	16%	25.50
11%	23.00	17%	26.50

Bessemer Ferrosilicon

F.o.b. Jackson County, Ohio, or Pittsburgh Furnace

Per Gross Ton		Per Gross Ton	
10%	$23.00	14%	$25.00
11%	23.50	15%	25.50
12%	24.00	16%	26.00
13%	24.50	17%	26.50

Manganese 1½ to 3%. $1 a ton additional. For each unit of manganese over 3%, $1 a ton additional. Phosphorus 0.65% or over, $1 a ton additional.

Other Ferroalloys

Ferrotungsten, per lb. wo. del., carloads	94c.
Ferrotungsten, less carloads	$1.00
Ferrochromium, 4 to 6% carbon and up, 65 to 70% Cr., per lb. contained Cr. delivered, in carloads	9.50c.
Ferrochromium, 2% carbon	16.50c. to 17.00c.
Ferrochromium, 1% carbon	17.50c. to 18.00c.
Ferrochromium, 0.10% carbon	19.50c. to 20.00c.
Ferrochromium, 0.06% carbon	20.00c. to 20.50c.
Ferrovanadium, del., per lb. contained Va.	$2.60 to 2.80
Ferrocarbontitanium, 15 to 18% per net ton, f.o.b. furnace in carloads	160.00
Ferrophosphorus, electric, or blast furnace material, in carloads, 18%, Rockdale, Tenn., base, per gross ton with $2 unitage	50.00
Ferrophosphorous, electric, 24% f.o.b. Anniston, Ala., per gross ton with $2.75 unitage	65.00
Ferromolybdenum, per lb. Mo., del.	95c.
Calcium molybdate, per lb. Mo., del.	80c.
Silico spiegel, per ton, f.o.b. furnace, car lots	$36.00
Ton lots or less, per ton	41.00
Silico-manganese, gross ton, delivered:	
2.50% carbon grade	85.00
2% carbon grade	90.00
1% carbon grade	100.00
Spot prices	$5 a ton higher

Ores

Lake Superior Ores, Delivered Lower Lake Ports

	Per Gross Ton
Old range, Bessemer, 51.5% iron	$4.80
Old range, non-Bessemer, 51.50% iron	4.65
Mesabi Bessemer, 51.50% iron	4.65
Mesabi non-Bessemer, 51.50% iron	4.50
High phosphorous, 51.50% iron	4.40

Foreign Ore, c.i.f. Philadelphia or Baltimore

	Per Unit
Iron, low phos., copper free, 55 to 58% iron, dry Spanish or Algerian	8c.
Iron, low phos., Swedish, average 64½% iron	8.50c.
Iron, basic or foundry, Swedish, average, 65% iron	8c.
Iron, basic or foundry, Russian, aver. 65% iron (nom.)	8c.
Manganese, Caucasian, washed 52%	22c.
Manganese, African, Indian, 44-48%	20c.
Manganese, African, Indian, 49-51%	21c.
Manganese, Brazilian, 46 to 48½	17c.

	Per Net Ton Unit
Tungsten, Chinese wolframite, duty paid*	$12.00
Tungsten, domestic scheelite*	$11.00 to $12.00

	Per Gross Ton
Chrome, 45%, Cr_2O_3, crude, c.i.f. Atlantic Seaboard	16.00
Chrome, 48%, Cr_2O_3, c.i.f. Atlantic seaboard	18.00

*Quotations nominal in absence of sales.

Fluorspar

	Per Net Ton
Domestic, washed gravel, 85-5 f.o.b. Kentucky and Illinois mines	$14.00
No. 2 lump, 85-5, f.o.b. Kentucky and Illinois mines	16.00
Foreign, 85% calcium fluoride, not over 5% silicon, c.i.f. Atlantic port, duty paid	17.90
Domestic, No. 1 ground bulk, 85 to 98% calcium fluoride, not over 2½% silicon, f.o.b. Illinois and Kentucky mines	30.00

Iron and Steel Scrap

PITTSBURGH

Per gross ton delivered consumers' yards:

No. 1 heavy melting steel	$13.50 to $14.00
No. 2 heavy melting steel	11.50 to 12.00
No. 2 railroad wrought	13.50 to 14.00
Scrap rails	13.50 to 14.00
Rails 3 ft. and under	15.00 to 15.50
Sheet bar crops, ordinary	14.50 to 15.00
Compressed sheet steel	13.00 to 13.50
Hand bundled sheet steel	12.00 to 12.50
Hvy. steel axle turnings	11.50 to 12.00
Machine shop turnings	10.50 to 11.00
Short shov. steel turnings	10.50 to 11.00
Short mixed borings and turnings	10.00 to 10.50
Cast iron borings	10.00 to 10.50
Cast iron carwheels	13.00 to 13.50
Heavy breakable cast	10.00 to 10.50
No. 1 cast	11.50 to 12.00
Railr. knuckles and couplers	15.00 to 15.50
Rail, coil and leaf springs	15.00 to 15.50
Rolled steel wheels	15.00 to 15.50
Low phos. billet crops	16.00 to 16.50
Low phos. sheet bar crops	15.00 to 15.50
Low phos. plate scrap	15.00 to 15.50
Low phos. punchings	15.00 to 15.50
Steel car axles	16.00 to 16.50

CHICAGO

Delivered Chicago district consumers:

	Per Gross Ton
Heavy melting steel	$10.50 to $11.00
Shoveling steel	10.50 to 11.00
Hydraulic comp. sheets	$9.00 to $9.50
Drop forge flashings	8.50 to 9.00
No. 1 busheling	9.25 to 9.75
Rolled carwheels	11.75 to 12.25
Railroad tires	11.50 to 12.50
Railroad leaf springs	11.50 to 12.00
Axle turnings	8.50 to 9.00
Steel couplers and knuckles	11.00 to 11.50
Coil springs	11.75 to 12.25
Axle turnings (elec. fur.)	8.50 to 9.00
Low phos. punchings	12.00 to 12.50
Low phos. plates, 12 in. and under	12.00 to 12.50
Cast iron borings	6.50 to 7.00
Short shoveling turnings	6.50 to 7.00
Machine shop turnings	6.00 to 6.50
Rerolling rails	12.00 to 12.50
Steel rails, less than 3 ft.	11.75 to 12.25
Steel rails, less than 2 ft.	12.00 to 12.50
Angle bars steel	11.50 to 12.00
Cast iron carwheels	10.50 to 11.00
Railroad malleable	10.50 to 11.00
Agricultural malleable	8.50 to 9.00

	Per Net Ton
Iron car axles	$12.50 to $13.00
Steel car axles	11.50 to 12.00
No. 1 railroad wrought	9.00 to 9.50
No. 2 railroad wrought	9.00 to 9.50

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No. 2 busheling	$4.00 to	$4.50
Locomotive tires, smooth	9.00 to	9.50
Pipe and flues	4.75 to	5.25
No. 1 machinery cast	10.50 to	11.00
Clean automobile cast	10.00 to	10.50
No. 1 railroad cast	10.00 to	10.50
No. 1 agricultural cast	8.75 to	9.25
Stove plate	7.75 to	8.25
Grate bars	6.75 to	7.25
Brake shoes	9.75 to	10.25

PHILADELPHIA

Per gross ton delivered consumers' yards:

No. 1 heavy melting steel	$11.50 to	$12.00
No. 2 heavy melting steel	10.00 to	10.50
No. 1 railroad wrought	....	12.00
Bundled sheets	8.50 to	9.00
Hydraulic compressed, new	10.50 to	11.00
Hydraulic compressed, old	8.50 to	9.00
Machine shop turnings	....	8.00
Heavy axle turnings	10.00 to	10.50
Cast borings	....	7.00
Heavy breakable cast	10.00 to	10.50
Stove plate (steel works)	....	9.00
No. 1 low phos. heavy	....	15.00
Couplers and knuckles	....	14.00
Rolled steel wheels	....	14.00
No. 1 blast furnace	....	7.00
Spec. iron and steel pipe	10.00 to	10.50
Shafting	15.00 to	15.50
Steel Axles	15.00 to	15.50
No. 1 forge fire	....	10.50
Cast iron carwheels	12.50 to	13.00
No. 1 cast	12.00 to	13.00
Cast borings (chem.)	10.00 to	10.50
Steel rails for rolling	12.00 to	12.50

CLEVELAND

Per gross ton delivered consumers' yards:

No. 1 heavy melting steel	$11.00 to	$11.25
No. 2 heavy melting steel	10.50 to	10.75
Compressed sheet steel	10.00 to	10.50
Light bundled sheet stampings	6.50 to	7.00
Drop forge flashings	10.00 to	10.50
Machine shop turnings	7.50 to	8.00
Short shoveling turnings	8.00 to	8.50
No. 1 busheling	10.00 to	10.50
Steel axle turnings	7.50 to	8.00
Low phos. billet crops	12.50 to	13.00
Cast iron borings	8.00 to	8.50
Mixed borings and short turnings	8.00 to	8.50
No. 2 busheling	8.00 to	8.25
No. 1 cast	11.00 to	11.50
Railroad grate bars	6.50 to	7.00
Stove plate	7.50 to	8.00
Rails under 3 ft.	10.00 to	10.50
Rails for rolling	10.50 to	11.00
Railroad malleable	10.00 to	10.50
Cast iron carwheels	....	11.00

BUFFALO

Per gross ton, f.o.b. Buffalo consumers' plants:

No. 1 heavy melting steel	$10.50 to	$11.00
No. 2 heavy melting scrap	10.00 to	10.50
Scrap rails	8.75 to	9.25
New hydraul. comp. sheets	9.75 to	10.25
Old hydraul. comp. sheets	9.25 to	9.75
Drop forge flashings	9.25 to	9.75
No. 1 busheling	8.75 to	9.25
Hvy. steel axle turnings	7.50 to	8.00
Machine shop turnings	6.25 to	6.50
Knuckles and couplers	11.50 to	12.00
Coil and leaf springs	11.50 to	12.00
Rolled steel wheels	11.50 to	12.00
Low phos. billet crops	12.50 to	13.00
Short shov. steel turnings	6.50 to	7.00
Short mixed borings and turnings	6.50 to	7.00
Cast iron borings	6.50 to	7.00
No. 2 busheling	6.00 to	6.50
Steel car axles	11.00 to	12.00
Iron axles	11.00 to	12.00
No. 1 machinery cast	11.25 to	12.25
No. 1 cupola cast	11.00 to	12.00
Stove plate	8.50 to	9.00
Steel rails, 3 ft. and under	12.00 to	12.50
Cast iron carwheels	9.00 to	9.50
Industrial malleable	11.50 to	12.00
Railroad malleable	11.50 to	12.00
Chemical borings	7.50 to	8.00

BIRMINGHAM

Per gross ton delivered consumers' yards:

Heavy melting steel	....	$10.00
Scrap steel rails	$9.00 to	9.50
Short shoveling turnings	4.50 to	5.00
Stove plate	6.50 to	7.00
Steel axles	11.00 to	11.50
Iron axles	11.00 to	11.50
No. 1 railroad wrought	7.00 to	7.50
Rails for rolling	....	11.00
No. 1 cast	....	10.50
Tramcar wheels	....	10.00
Cast iron borings, chem.	....	8.00

ST. LOUIS

Per gross ton delivered consumers' yards:

Selected heavy steel	$9.50 to	$10.00
No. 1 heavy melting	8.50 to	9.00
No. 2 heavy melting	8.00 to	8.50
No. 1 locomotive tires	7.00 to	7.50
Misc stand.-sec. rails	10.00 to	10.50
Railroad springs	9.50 to	10.00
Bundled sheets	6.00 to	6.50
No. 2 railroad wrought	8.50 to	9.00
No. 1 busheling	3.50 to	4.00
Cast iron borings and shoveling turnings	3.00 to	3.50
Rails for rolling	10.50 to	11.00
Machine shop turnings	3.00 to	3.50
Heavy turnings	4.00 to	4.50
Steel car axles	10.00 to	10.50
Iron car axles	11.00 to	11.50
Wrot. iron bars and trans.	8.50 to	9.00
No. 1 railroad wrought	6.00 to	6.50
Steel rails less than 3 ft.	11.50 to	12.00
Steel angle bars	10.00 to	10.50
Cast iron carwheels	8.50 to	9.00
No. 1 machinery cast	8.00 to	8.50
Railroad malleable	8.00 to	8.50
No. 1 railroad cast	8.00 to	8.50
Stove plate	7.00 to	7.50
Relay rails, 60 lb. and under	16.00 to	16.50
Relay rails, 60 lb. and over	$20.00 to	$21.00
Agricult. malleable	6.00 to	6.50

BOSTON

Dealers' buying prices per gross ton:

No. 1 heavy melting steel	$7.00 to	$7.50
Scrap T rails	6.50 to	7.00
Machine shop turnings	4.00 to	4.50
Cast iron borings	4.00 to	4.50
Bundled skelton, long	4.50 to	5.00
Forge flashings	4.50 to	5.00
Blast furnace scrap	4.00 to	4.50
Shafting	9.00 to	9.50
Steel car axles	8.50 to	9.00
Wrought pipe	3.50 to	4.00
Rails for rerolling	6.00 to	6.50
Cast iron borings, chemical	9.00 to	9.50

Per gross ton delivered consumers' yards:

Textile cast	$8.50 to	$10.00
No. 1 machinery cast	8.50 to	9.00
Stove plate	6.25 to	6.50
Railroad malleable	11.00 to	12.00

NEW YORK

Dealers' buying prices per gross ton:

No. 1 heavy melting steel	$7.75 to	$8.00
No. 2 heavy melting steel	6.50 to	7.00
Heavy melting steel (yard)	2.50 to	3.00
No. 1 heavy breakable cast	6.50 to	6.75
Stove plate (steel works)	5.25 to	6.00
Machine shop turnings	4.00 to	4.50
Short shoveling turnings	4.00 to	4.50
Cast borings	4.00 to	4.25
No. 1 blast furnace	4.00 to	4.25
Steel car axles	10.00 to	10.50
Spec. iron and steel pipe	$3.50 to	$4.00
Forge fire	5.00 to	5.25
No. 1 railroad wrought	6.50 to	7.00
No. 1 yard wrought, long	4.50 to	5.00
Rails for rolling	7.50 to	8.00
No. 1 cast	6.50 to	7.00
No. 2 cast	5.50 to	6.50
Stove plate (foundry)	5.50 to	6.00
Cast borings (chemical)	6.50 to	7.00

Per gross ton, delivered local foundries:

No. 1 machinery cast	$10.00
No. 1 hvy. cast (cupola size)	9.00
No 2 cast	7.00

CINCINNATI

Dealers' buying prices per gross ton:

Heavy melting steel	$9.25 to	$9.75
Scrap rails for melting	9.00 to	9.50
Loose sheet clippings	4.50 to	5.00
Bundled sheets	5.50 to	6.00
Cast iron borings	6.00 to	6.50
Machine shop turnings	5.50 to	6.00
No. 1 busheling	6.75 to	7.25
No. 2 busheling	3.00 to	3.50
Rails for rolling	9.50 to	10.00
No. 1 locomotive tires	8.25 to	8.75
Short rails	11.00 to	11.50
Cast iron carwheels	8.50 to	9.00
No. 1 machinery cast	9.50 to	10.00
No. 1 railroad cast	9.00 to	9.50
Burnt cast	6.75 to	7.25
Stove plate	6.75 to	7.25
Agricultural malleable	8.50 to	9.00
Railroad malleable	9.00 to	9.50

DETROIT

Dealers' buying prices per gross ton:

Hvy. melting steel	$9.50 to	$10.00
Borings and short turnings	6.50 to	7.00
Long turnings	5.75 to	6.25
No. 1 machinery cast	8.00 to	8.50
Automotive cast	10.00 to	10.50
Hydraul. comp. sheets	9.50 to	10.00
Stove plate	5.00 to	5.50
New No. 1 busheling	7.50 to	8.00
Old No. 2 busheling	5.50 to	6.00
Sheet clippings	6.00 to	6.50
Flashings	7.00 to	7.50

CANADA

Dealers' buying prices per gross ton:

	Toronto	Montreal
Heavy melting steel	$5.50	$5.50
Rails, scrap	6.00	4.50
Machine shop turnings	2.50	2.50
Boiler plate	4.50	4.50
Heavy axle turnings	2.50	2.50
Cast borings	3.00	3.00
Steel borings	2.00	2.00
Wrought pipe	2.50	2.50
Steel axles	4.50	6.00
Axles, wrought iron	4.50	6.50
No. 1 machinery cast	7.75	9.00
Stove plate	4.50	5.00
Standard carwheels	7.25	7.00
Malleable	6.75	7.00

Warehouse Prices for Steel Products

PITTSBURGH

	Base per Lb.
Plates	2.85c.
Structural shapes	2.85c.
Soft steel bars and small shapes	2.60c.
Reinforcing steel bars	2.60c.
Cold-finished and screw stock—	
Rounds and hexagons	2.95c.
Squares and flats	2.95c.
Hoops and bands, under ¼ in.	2.95c.
Hot-rolled annealed sheets (No. 24), 25 or more bundles	3.15c.
Galv. sheets (No. 24), 25 or more bundles	3.50c.
Hot-rolled sheets (No. 10)	2.50c.
Galv. corrug. sheets (No. 28), per square (more than 3750 lb.)	$3.32
Spikes, large	2.40c.
Small	2.65c.
Boat	2.90c.
Track bolts, all sizes, per 100 count,	70 per cent off list.
Machine bolts, 100 count,	70 per cent off list.
Carriage bolts, 100 count,	70 per cent off list.
Nuts, all styles, 100 count,	70 per cent off list.
Large rivets, base per 100 lb.	$3.25
Wire, black, soft, ann'l'd, base per 100 lb.	2.90
Wire, galv. soft, base per 100 lb.	3.35
Common wire nails, per keg	2.45
Cement coated nails, per keg	2.45

On plates, structurals, bars, reinforcing bars, bands, hoops and blue annealed sheets, base applied to orders of 400 to 999 lb.

CHICAGO

	Base per Lb.
Plates and structural shapes	3.00c.
Soft steel bars	2.75c.
Reinforc. bars, billet steel	1.75c. to 1.90c.
Rail steel reinforcement	1.50c. to 1.65c.
Cold-fin. steel bars and shafting	
Rounds and hexagons	3.00c.
Flats and squares	3.50c.
Bands, 3/16 in. (in Nos. 10 and 12 gages)	2.95c.
Hoops (No. 14 gage and lighter)	3.50c.
Hot-rolled annealed sheets (No. 24)	3.45c.
Galv. sheets (No. 24)	4.10c.
Hot-rolled sheets (No. 10)	2.75c.
Spikes (3/16 in. and lighter)	3.45c.
Track bolts	4.30c.
Rivets, structural (keg lots)	3c.
Rivets, boiler (keg lots)	3c.
	Per Cent Off List
Machine bolts	65
Carriage bolts	65
Coach and lag screws	65
Hot-pressed nuts, sq., tap. or blank	65
Hot-pressed nuts, hex., tap. or blank	65
Hex. head cap screws	80 and 10
Cup point set screws	75
Flat head bright wood screws	50 and 10
Spring cotters	60 and 10
Stove bolts	80
Rd. hd. tank rivets, 7/16 in. and smaller	65
Wrought washers	$4.50 off list
No. 8 black ann'l'd wire per 100 lb.	$3.45
Com. wire nails, base per keg	2.55
Cement c't'd nails, base per keg	2.55

NEW YORK

	Base per lb.
Plates and struc. shapes	3.10c.
Soft steel bars, small shapes	3.10c.
Iron bars	3.24c.
Iron bars, swed. charcoal	6.00c. to 6.50c.
Cold-fin. shafting and screw stock;	
Rounds and hexagons	3.54c.
Flats and squares	4.04c.
Cold-roll. strip, soft and quarter hard	4.95c.
Hoops	3.30c.
Bands	3.30c.
Hot-rolled sheets (No. 10)	3.00c.
Hot-rolled ann'l'd sheets (No. 24*)	3.65c.
Galvanized sheets (No. 24*)	4.00c.
Long terne sheets (No. 24)	4.50c.
Standard tool steel	12.00c.
Wire, black annealed (No. 10)	3.60c.
Wire, galv. annealed (No. 10)	4.05c.
Tire steel ⅝ x ⅛ in. and larger	3.40c.
Smooth finish, 1 to 2½ x ¼ in. and larger	3.75c.
Open hearth spring steel, bases	4.50c. to 7.00c.
Common wire nails, base, per keg	$2.90
	Per Cent
Machine bolt, cut thread:	Off List
¾ x 6 in. and smaller	65 to 65 and 10
1 x 30 in. and smaller	65 to 65 and 10
Carriage bolts, cut thread:	
½ x 6 in. and smaller	65 to 65 and 10
¾ x 20 in. and smaller	65 to 65 and 10
Boiler tubes:	Per 100 Ft.
Lap welded, 2-in.	$18.05
Seamless welded, 2-in.	19.24
Charcoal iron, 2-in.	24.94
Charcoal iron, 4-in.	63.65

*No. 28 and lighter, 36 in. wide, 20c. higher per 100 lb.

ST. LOUIS

	Base per Lb.
Plates and struc. shapes	3.25c.
Bars, soft steel or iron	3.00c.
Cold-fin. rounds, shafting, screw stock	3.36c.
Hot-rolled annealed sheets (No. 24)	3.60c.
Galv. sheets (No. 24)	4.00c.
Hot-rolled sheets (No. 10)	3.00c.
Black corrug. sheets (No. 24)	3.65c.
Galv. corrug. sheets	4.05c.
Structural rivets	3.00c.
Boiler rivets	3.00c.
	Per Cent Off List
Tank rivets, 7/16 in. and smaller.	
100 lb. or more	70
Less than 100 lb.	70
Machine bolts	65
Carriage bolts	65
Lag screws	65
Hot-pressed nuts, sq. blank or tapped, 200 lb. or more	65
Less than 200 lb.	55
Hot-pressed nuts, hex., blank or tapped, 200 lb. or more	65
Less than 200 lb.	55

PHILADELPHIA

	Base per Lb.
*Plates, ¼-in. and heavier	2.45c.
*Structural shapes	2.45c.
*Soft steel bears, small shapes, iron bars (except bands)	2.45c.
Reinforc. steel bars, sq., twisted and deform.	2.30c.
Cold-finished steel bars	3.35c.
*Steel hoops	3.00c.
*Steel bands, No. 12 to 3/16 in., incl.	2.75c.
Spring steel	5.00c.
†Hot-rolled annealed sheets (No 24)	3.15c.
†Galvanized sheets (No. 24)	3.50c.
*Hot-rolled annealed sheets (No. 10)	2.70c.
Diam. pat. floor plates, ¼ in.	5.00c.
Swedish iron bars	6.00c.

These prices are subject to quantity differentials except on reinforcing and Swedish iron bars.

*Base prices subject to deductions on orders aggregating 4000 lb. or over.

†For 50 bundles or over.

CLEVELAND

	Base per Lb.
Plates and struc. shapes	2.95c.
Soft steel bars	2.75c.
Reinforc. steel bars	1.75c. to 2.35c.
Cold-fin. steel bars	2.95c.
Flat rolled steel under ¼ in.	3.00c.
Cold-finished strip	5.55c.
Hot-rolled annealed sheets (No. 24)	3.25c.
Galvanized sheets (No. 24)	3.85c.
Hot-rolled sheets (No. 10)	2.75c.
Black ann'l'd wire, per 100 lb.	$2.55
No. 9 galv. wire, per 100 lb.	2.90
Com. wire nails, base per keg	2.35

*Net base, including boxing and cutting to length.

CINCINNATI

	Base per Lb.
Plates and struc. shapes	3.25c.
Bars, soft steel or iron	3.00c.
New billet reinforc. bars	3.00c.
Rail steel reinforc. bars	3.00c.
Hoops	3.75c.
Bands	3.20c.
Cold-finished bars	3.32c.
Hot-rolled annealed sheets (No. 24)	3.60c.
Galv. sheets (No. 24)	4.00c.
Hot-rolled sheets (No. 10)	3.05c.
Structural rivets	4.00c.
Small rivets	60 per cent off list
No. 9 ann'l'd wire, per 100 lb.	$3.00
Com. wire nails, base per keg (10 to 49 kegs)	2.65
Larger quantities	2.50
Cement c't'd nails, base 100-lb. keg	2.95
Chain, 1-in., per 100 lb.	6.00
	Net 100 Ft.
Seamless steel boiler tubes, 2-in.	$15.87
4-in.	34.57
Lap-welded steel boiler tubes, 2-in.	15.12
4-in.	32.96

BUFFALO

	Base per Lb.
Plates and struc. shapes	3.20c.
Soft steel bars	2.95c.
Reinforcing bars	2.95c.
Cold-fin. flats and sq.	3.00c.
Rounds and hex.	3.00c.
Cold-rolled strip steel	5.25c.
Hot-rolled annealed sheets (No. 24)	3.35c.
Galv. sheets (No. 24)	3.75c.
Bands	3.30c.
Hoops	3.55c.
Hot-rolled sheets (No. 10) 48-in. and narrower	3.00c.
Wider than 48-in.	3.25c.
Com. wire nails, base per keg	$2.40
Black wire, base per 100 lb.	3.25

BOSTON

	Per Lb.
*Beams, channels, angles, tees, zees	2.60c.
*H beams and shapes	2.60c.
*Plates—sheared, tank and univ. mill, ¼ in. thick and heavier	2.60c.
*Floor plates, diamond pattern	4.50c.
*Bar and bar shapes (mild steel)	2.50c.
*Bands 3/16 in. thick and No. 12 ga. incl.	3.50c.
Hoops, No. 14 ga. and lighter	4.90c. to 5.40c.
*Half rounds, half ovals, ovals and bevels	3.75c.
Tire steel, rd. edge 1⅛ x ⅛ in. and larger	4.50c.
Smaller sizes	4.75c.
Cold-finished rounds and hexagons	3.60c.
Cold-rolled strip steel	5.20c.
Cold-finished squares and flats	4.10c.
*Blue annealed sheets, No. 10 ga.	2.45c.
One pass cold-rolled sheets No. 24 ga.	3.50c.
Blued stove pipe sheets, No. 24 ga.	3.90c.
Galvanized steel sheets No. 24 ga.	4.00c.
Lead coated (long ternes) No. 24 ga.	5.00c.
Black wire, base per 100 lb., 2500 lb. or less	3.35c.
Over 2500 lb.	3.25c.

Base prices for 40,000 lb. orders; extras apply for smaller quantities.

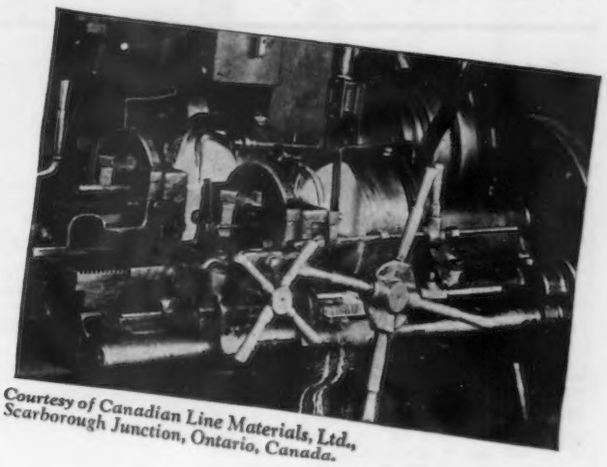
PACIFIC COAST

	Base per Lb.		
	San Francisco	Los Angeles	Seattle
Plates, tank and U.M.	2.80c.	3.30c.	3.15c.
Shapes, standard	3.15c.	3.30c.	3.15c.
Wide-flanged beams and columns	3.25c.	3.30c.	3.50c.
Soft steel bars	3.15c.	3.30c.	3.15c.
*Reinforcing bars	2.90c.	3.00c.	3.15c.
Hot-rolled annealed sheets (No. 24)	3.95c.	4.20c.	4.50c.
Hot-rolled sheets (No. 10)	3.33c.	3.80c.	3.75c.
Galv. sheets (No. 24)	4.55c.	4.50c.	5.00c.
*Struc. rivets, ½ in. and larger	5.75c.	6.00c.	5.25c.
*Cold finished steel			
Rounds	5.50c.	5.50c.	4.50c.
Squares and hexagons	6.75c.	6.75c.	5.75c.
Flats	7.25c.	7.25c.	6.75c.
Common wire nails —base per keg	$2.65	$2.55	$2.70
less carload			

*Subject to deductions for quantity.

Courtesy of Canadian Acme Screw & Gear, Ltd., Toronto, Ontario, Canada

OPERATION: HOBBING ROUGH CUT ON DRIVE PINIONS.
MACHINE: BARBER-COLMAN GEAR HOBBER.
MATERIAL: UPSET FORGING S.A.E. 6150.
LENGTH AND DEPTH OF CUT: 1.5 INCH LONG AND .255 INCH DEEP.
PRODUCTION: 12 PIECES PER HOUR.
LUBRICANT: 1 PART SUNOCO TO 6 PARTS WATER.



Courtesy of Canadian Line Materials, Ltd., Scarborough Junction, Ontario, Canada.

OPERATION: THREADING 2½ INCHES ON ONE END OF 3/4 INCH ROD STEEL, AND 2 HEADS ON HIGH CONE.
MACHINE: LANDIS DOUBLE-HEAD THREADING MACHINE.
MATERIAL: BOLT STEEL, .25 CARBON.
PRODUCTION: 200 PIECES PER HOUR.
LUBRICANT: 1 PART SUNOCO TO 10 PARTS WATER

PROFITS are made...*or lost*... at the point of the cutting tool

IN your efforts to secure operating economies and efficiency (with consequent better profits) don't overlook the far-reaching importance of your cutting lubricant.

Increased machine speed, longer runs per tool grind, less lost time for resetting, reduced tool maintenance, greater accuracy and better finish—all lead to greater profits—and *all* are made possible with Sunoco Emulsifying Cutting Oil.

In addition, SUNOCO protects the finished work from rust and corrosion. It will not separate, and is hygienic; does not become rancid after prolonged use.

We cordially invite your correspondence and offer the services of our experienced Cutting Oil Engineers.

SUN OIL COMPANY, PHILADELPHIA, PA., U.S.A.

SUNOCO
EMULSIFYING
CUTTING OIL

Made by the producers of BLUE SUNOCO MOTOR FUEL

Akron, Albany, Allentown, Atlantic City, Baltimore, Battle Creek, Beaumont, Bridgeport, Buffalo, Chicago, Cincinnati, Cleveland, Columbus, Dallas, Dayton, Detroit, Flint, Grand Rapids, Harrisburg, Jackson (Mich.), Jacksonville, Miami, Newark, New York, Philadelphia, Pittsburgh, Providence, Reading, Rochester, Scranton-Wilkes Barre, Syracuse, Tampa, Toledo, Trenton, Wilmington, Youngstown.

Subsidiary Companies:

Sun Company . . . Tulsa Sun Oil Co., Ltd., . . . Montreal and Toronto British Sun Oil Co., Ltd., . . . London, England.

PLANT EXPANSION AND EQUIPMENT BUYING

NEW ENGLAND

Chapman Valve Mfg. Co., Indian Orchard, Mass., manufacturer of heavy gate valves, etc., has acquired plant and business of Automatic Cone Valve Co., Mattoon, Ill., manufacturer of valve specialties, and will consolidate. Equipment is being removed to Indian Orchard works, where expansion will be carried out.

Water Department, Braintree, Mass., plans installation of pumping machinery and other mechanical equipment for new filtration plant. Cost about $75,000. Weston & Sampson, 14 Beacon Street, Boston, are consulting engineers.

Eagle Range Oil Burner Corpn., Hartford, Conn., has been organized by Joseph Prichard, 6 Woodland Street, and associates, capital $50,000, to manufacture oil burners and oil-burning equipment.

Bridgeport Brass Co., Bridgeport, Conn., has tripled working force during past four months and is now giving employment to about 1800 operatives. A wage advance of 10 per cent has been made, effective July 17.

Board of Education, Auburn, Me., G. R. Gardner, school superintendent, plans manual training department in new two-story and basement junior high and grammar school. Cost about $125,000. Miller & Beal, Inc., 465 Congress Street, Portland, Me., is architect.

Reed Gas Brake Co., Inc., Boston, has been organized by Arthur Reed and William Waters, 218 West Canton Street, to manufacture machanical equipment and parts.

Naumkeag Oil Co., Salem, Mass., has acquired 28,000 sq. ft. for new bulk oil storage and distributing plant. Company will engage as distributing agent for Sinclair Oil Co., New York, throughout Essex County.

NORTH ATLANTIC

Interboro Beverage Corpn., 165-207 Melrose Street, Brooklyn, is continuing expansion and will build three-story brew-house and multi-story malt storage and distributing building, in addition to bottling works and cooperage unit, previously announced. Cost about $500,000. Shampan & Shampan, 188 Montague Street, are architects.

Peak Motor Products Co., Inc., New York, manufacturer of automobile parts, has leased two-story building at 554 West Forty-eighth Street for new plant.

Perry Metal Products Co., Inc., Brooklyn, has been organized by Frederick Massoh, 117-19 132nd Street, Jamaica, L. I., and associates, to manufacture metal goods.

Penn-Mar-Kentucky, Inc., New York, is being organized as a joint subsidiary of United States Industrial Alcohol Co., 60 East Forty-second Street, and National Distillers Products Corpn., 52 William Street, to erect or lease plants for distilleries in different parts of country. Negotiations are under way for initial properties.

Tubize Chatillon Corpn., 2 Park Avenue, New York, manufacturer of cellulose rayon products, has engaged J. E. Sirrine & Co., Greenville, S. C., architect and engineer, to draw plans for addition to mill at Rome, Ga., for expansion in viscose division. Cost about $500,000 with machinery.

Union Mould & Metal Corpn., New York, has been organized by Edwin and Richard Greene, Griffin Avenue, Mamaroneck, N. Y., and Hans Schneider, 46 West Seventy-sixth Street, New York, to manufacture metal products.

Freeport Sulphur Co., 122 East Forty-second Street, New York, subsidiary of Freeport Texas Co., same address, has work under way on initial units of new sulphur mining and refining plant at Lake Grande Ecaille, La. Cost about $2,000,000 with equipment. J. F. Coleman Engineering Co., Hibernia Bank Building, New Orleans, is consulting engineer.

Smoot Engineering Corpn., 36 Flatbush Avenue Extension, Brooklyn, manufacturer of heating control devices and mechanisms, has leased floor in Gerli factory building, Morris Avenue, Summit, N. J., for new plant.

Du Pont Rayon Co., Inc., 350 Fifth Avenue, New York, is planning addition to acetate rayon mill at Waynesboro, Va., for extensions in solvent recovery equipment department. Cost over $50,000 with equipment.

Constructing Quartermaster, West Point, N. Y., will secure appropriation of $365,748 under National Industrial Recovery Act for central steam heating and electrical systems, improvements in buildings and water system, including pipe lines, etc. Bids to be asked soon.

Christian Feigenspan Corpn., 50 Freeman Avenue, Newark, N. J., let general contract to M. Stefany, 246 Fabyan Place, for one-story and basement addition to brewery, 95 x 100 ft. Cost over $50,000 with equipment.

Newark Mfg. & Engineering Co., Newark, has been organized by Frank and Joseph Martina, 174 Orchard Street, to manufacture chemical machinery and parts.

Lakeland Mfg. Corpn., Dover, N. J., recently organized to manufacture electric portable hoists, electric household appliances, etc., has leased building on King Street for new plant.

City Commission, Bordentown, N. J., plans municipal electric light and power plant, with Diesel engine-generator units, and construction of about 12 miles of transmission lines. Charles B. Rodgers, 105 Mary Street, is head of committee in charge. Cost over $85,000 with equipment.

Gas Generator Corpn., Newark, has been organized under direction of Samuel S. Ferster, 31 Clinton Street, capital $25,000, to manufacture gas generating equipment.

Scholler Brothers, Inc., Amber and Westmoreland Streets, Philadelphia, manufacturer of soaps, etc., has let general contract to William F. Lotz, Oxford Bank Building, for additions. Cost about $85,000 with equipment.

De La Vergne Engine Co., Eddystone, Pa., has developed new self-contained air-conditioning equipment for domestic and commercial service, electric-operated, and plans large production for parts and assembling.

Greencastle Mfg. Co., Greencastle, Pa., recently organized to manufacture garage equipment, has leased building from Landis Tool Co., for production of lifts and jacks, wrecking cranes and kindred specialties. Earl F. Green, Greencastle, is president and treasurer; G. Warner Harsh is secretary.

Borough Council, Camp Hill, Pa., plans installation of pumping machinery, pipe lines, etc., for new sewage system. Cost $235,000. Albright & Friel, Inc., 246 South Fifteenth Street, Philadelphia, is consulting engineer.

Homer M. Mulligan, Allentown, Pa., has leased building at Newville, Pa., formerly occupied by J. S. Elliott Co., and will remodel for manufacture of soaps and kindred products.

Adams Foundry Corpn., Philadelphia, has been organized to manufacture iron and other metal castings, metal patterns, etc., and will take over Adams Foundry Co., 1922 Brandywine Street.

Rochester Engineering & Centrifugal Corpn., Rochester, N. Y., has been organized by Verner C. Kreuter, 1505 Highland Avenue, and Alexander K. Dean, 542 Arnett Boulevard, capital $100,000, to manufacture machinery and mechanical appliances.

SOUTH CENTRAL

Kingham Trailer Co., Gaulbert and Floyd Streets, Louisville, manufacturer of motor trailers, parts, etc., plans new one-story plant, 125 x 300 ft. Cost about $45,000 with equipment.

Northeast Kentucky Tipple Co., Catlettsburg, Ky., plans new coal tipple on waterfront. Cost about $200,000 with hoisting, conveying, loading and other equipment.

New Iberia Canning Co., New Iberia, La., is planning installation of equipment for alcohol production, using molasses as raw material.

William Gerst Brewing Co., 826 Sixth Avenue South, Nashville, Tenn., has authorized extensions and improvements, including new equipment. Cost over $60,000 with machinery.

Kentucky Brewing Co., Fifteenth Street, Louisville, plans new five-story brew-house and one-story bottling works, including new machinery. Cost over $275,000. Frank H. Lanham is president. Walter C. Wagner, Louisville, is architect.

City Council, Greensburg, Ky., plans installation of 75,000-gal. elevated steel tank on steel tower, 36,000-gal. steel settling tank, high and low lift pumping machinery, pipe lines, etc., for new water supply and distributing system. Cost over $90,000. H. K. Bell, McClelland Building, Lexington, Ky., is consulting engineer.

SOUTH ATLANTIC

Constructing Quartermaster, Fort George Meade, Md., will secure appropriation of $50,000 under new National Industrial Recovery Act for new equipment, storage and distributing plant, and will soon ask bids; also, $75,000 for new water system with pipe lines, etc., and part of $170,000 fund for new electrical distributing system.

Southern Breweries, Inc., 507 Commercial Bank Building, Charlotte, N. C., Franklin G. King, president, has plans for new four-story and basement brew-house, 125 x 175 ft. Work is being started on one-story bottling works, 80 x 105 ft. Other units, including power house, will be built. Cost about $425,000 with equipment. E. A. Mees, Mees & Mees, Court Arcade, is engineer.

Harris-Cole Co., 207 Walker Street, Atlanta, Ga., recently organized by Arthur W. Harris and R. D. Cole, plans early operation of plant for manufacture of loom equipment for textile mills.

City Council, Bradenton, Fla., plans installation of Diesel engine-generator unit and other equipment for municipal electric light and power plant. New electrical distributing system is planned. E. V. Camp, Atlanta, Ga., is consulting engineer.

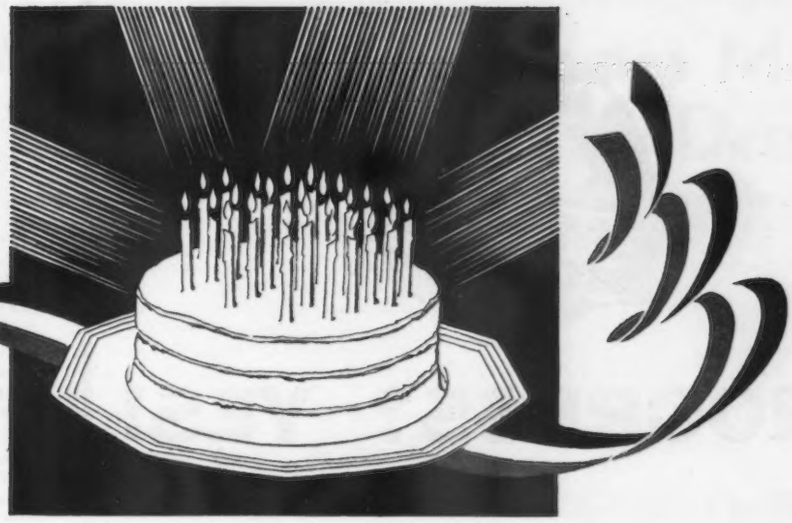
Virginia Brewing Co., Roanoke, Va., R. C. Churchill, secretary-treasurer, plans extensions and improvements for capacity of about 25,000 bbl. a year. Cost over $85,000 with equipment.

United States Engineer Office, P. O. Box 45, Jacksonville, Fla., asks bids until Aug. 3 for manganese steel rock cutter castings, forged steel keys, cutter teeth, etc., for dredges Welatka and Barnard (Circular 34).

Crown Cork & Seal Co., Eastern Avenue and Kresson Street, Baltimore, manufacturer of bottle caps and seals, bottle-capping machinery, parts, etc., has let general contract to E. Eyring & Sons Co., 808 South Conkling Street, for three-story addition. Cost over $45,000 with equipment.

Bureau of Yards and Docks, Navy Department, Washington, asks bids (no closing date stated) for floating steel deck for gasoline tank at navy yard, Charleston, S. C. (Specifications 7341).

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Aug. 1 for 22 portable electric drills (Schedule 425) for Norfolk Navy Yard; drain pumps and spare parts (Schedule 445), one turbine-driven boiler feed pump (Schedule 397), electric cable, wire and cord (Schedule 410), insulated cable, wire and cord (Schedule 406), thermostatic traps and strainers (Schedule 405) all for Eastern and Western yards; 1550 lb. hydraulic packings (Schedule 442) for Washington yard; five distilling plant units and spare parts (Schedule 409) for Boston, Brooklyn and Philadelphia yards; motor-driven wire rope and



25 CANDLES ON THE CAKE FOR *Toncan* IRON

No matter where you go you will find someone who thinks that Toncan Iron is something new—an infant among industrial products. As a matter of fact, it is a rather lusty infant—twenty-five years old this year, and still growing.

As it was introduced twenty-five years ago, it was a commercially pure iron with rust-accelerating impurities reduced to lowest practicable limits. Later copper was alloyed with the iron to make it more resistant to attack. Then molybdenum became an important part of the analysis when all tests proved that the addition of this element produced a true alloy with a degree of resistance to rust never before attained with ferrous metals, except in the stainless alloys.

Such is the Toncan Iron of today that is used in making Toncan Iron Pipe. Of such material is the pipe that is writing new records for longer life in service in factories, chemical plants, aboard ship, in power plants, on railroad cars and locomotives, in oil wells and refineries, in coal mines—wherever corrosion or vibration quickly saps the life from other pipe that may cost a trifle less to buy but that in the end proves far more expensive.

There's a new edition of "Pipe for Permanence" coming off the press in a few days. Send your request for a copy and it will be mailed to you just as soon as it is available.

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PROGRESS? YES!

When we say that Mansfield Electrical Sheets are INHERENTLY GOOD, and they are, we do not mean that we feel satisfied with them. When they are perfect, we won't need to do much but rest, but now we are hustling constantly and making PROGRESS.

PROGRESS means to us doing a better job, giving you better sheets, better looking and better behaving, so that your job may be easier and that your motors and transformers may be better.

"Satisfaction is the worst enemy of progress and is one of the world's worst diseases."

C. F. Kettering

MANSFIELD ELECTRICAL SHEETS

EMPIRE STEEL CORPORATION

Mansfield, Ohio

Sales Offices:

New York, Dayton, Cleveland, Indianapolis, Chicago, Detroit, St. Louis, San Francisco

trolley suspension hoists (Schedule 444), 2628 sq. ft. corrosion-resisting steel gratings (Schedule 450) for Brooklyn, Philadelphia, Mare Island and Puget Sound yards; about 13,000 lb. corrosion-resisting steel tubing (Schedule 446) for Puget Sound yard.

SOUTHWEST

St. Louis-San Francisco Railroad Co., Frisco Building, St. Louis, has approved plans for new 17-stall engine house, with shop and repair facilities, at Oklahoma City, Okla., to replace structure recently destroyed by fire. Cost over $100,000 with equipment.

Muehlebach Brewery, Eighteenth and Main Streets, Kansas City, Mo., Carl Muehlebach, head, inactive for several years, plans expansion and modernization, including brewing, bottling, mechanical-cooling and other equipment. Cost over $150,000 with machinery. Ford, Bacon & Davis, 39 Broadway, New York, are engineers.

Utility Tool Mfg. Co., St. Louis, has been organized by Joseph Pavelka, Paul Brown Building, and associates, capital $50,000, to manufacture tools and mechanical equipment. Company will take over organization of same name at 620 Tower Grove Street.

Bailor Mfg. Co., Atchison, Kan., manufacturer of alcohol products, plans extensions and improvements, including multi-story addition. Cost over $70,000 with equipment. Edward H. Gill, Fairfax Building, Kansas City, Mo., is engineer.

Moore-Lowry Co., 608 Board of Trade Building, Topeka, Kan., plans rebuilding of flour mill recently destroyed by fire. Loss over $150,000 with machinery.

Progress Brewing Co., Oklahoma City, Okla., care of F. E. Manamaker, 125 N. E. Thirteenth Street, recently organized with capital of $500,000, has plans for new multi-unit plant, with brew-house, bottling works, storage and distributing plant, power house, machine shop and other structures. Cost about $400,000 with equipment.

Electrol, Inc., 170 Dorcas Street, St. Louis, manufacturer of oil burners, parts, etc., plans rebuilding part of plant recently destroyed by fire. Loss about $35,000 with equipment.

Peerless Metal Products Corpn., Austin, Tex., has been organized by Benjamin J. Ryan and C. W. Moore, both Austin, to manufacture metal goods.

CENTRAL DISTRICT

Pittsburgh Coal Co., Oliver Building, Pittsburgh, plans new river-rail coal terminal near Beaver, Pa., including tipple, bulk storage and distributing plant, wharf, docks and other structures. Appropriation of $1,250,000 authorized, including machinery.

Hammermill Paper Co., East Lake Erie Road, Erie, Pa., has let general contract to Henry Shenk Co., Twelfth Street, for two-story addition, 195 x 200 ft. Cost over $100,000 with equipment.

New Castle Lime & Stone Co., New Castle, Pa., has taken over plant of Kittanning Limestone Co., recently purchased, and plans extensions and improvements, including new machinery. Cost $25,000 with equipment.

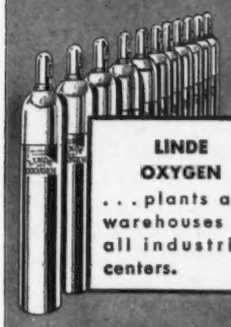
Schenley Distillers Corpn., Pittsburgh, recently organized, capital $7,500,000, to take over Schenley Products Co., Clark Building, with distilleries near Pittsburgh, Lexington, Ky., and other points, has arranged for a stock issue of $3,450,000, part of fund to be used for expansion and improvements, including acquisition of other properties. Company will take over distillery of James E. Pepper Co., Lexington, Ky.

Board of Trustees, Carnegie Institute, Schenley Park, Pittsburgh, has plans for extensions in power house, to develop central steam-heating plant for all institute buildings in immediate vicinity. Rust Engineering Co., Koppers Building, is designing engineer. R. G. Ambrose is institute engineer.

Peerless Co., Quincy and East Ninety-third Streets, Cleveland, recently organized as a subsidiary of Peerless Motor Car Corpn., same address, has engaged Julius C. Schultz, 1370 Main Street, Buffalo, architect, to draw plans for new brewery to occupy about 100,000 sq. ft. floor space of plant of parent company, with one-story addition. Cost about $530,000 with equipment.

City Council, Kenton, Ohio, plans municipal electric light and power plant and will arrange financing for about $500,000 for unit, including equipment. H. P. Jones, Second National Bank Building, Toledo, Ohio, is consulting engineer.

EVERYTHING FOR
OXY-ACETYLENE
WELDING & CUTTING



LINDE OXYGEN
. . . plants and warehouses in all industrial centers.

PREST-O-LITE ACETYLENE
. . . the standard for well over a quarter of a century.

OXWELD APPARATUS AND SUPPLIES
. . . available for every oxy-acetylene welding and cutting operation.

UNION CARBIDE
. . . sold in the familiar Blue and Grey drum from over 250 warehouse stocks.

Oxwelding Overcomes Many Limitations of Common Designs

Pump Cylinder Heads

Redesign of air-lock pump cylinder heads for oxy-acetylene cutting and welding enabled a manufacturer to eliminate failures in service. When castings were used, tightening of the adjusting screw, which worked through a boss in the center of the head, caused fracture of the boss. Close fitting tolerances of the part adjacent made heavier castings impractical. Oxy-acetylene shape cut plate was substituted for castings. A short piece of shafting was oxwelded to the plate to take the adjusting screw. The design proved amply strong and highly satisfactory. Unexpected production economies were also realized. Case No. 5045**

Furniture

The flexibility of the oxy-acetylene process is essential to a New York furniture manufacturer, much of whose work is done on special order to fit individual decorative schemes. Oxwelding removes design limitations imposed by other methods of fabrication and permits improvements and style changes to be made without increased outlay of capital and loss of production time. Oxwelding has reduced his manufacturing costs 25 per cent and has increased speed of production 50 per cent. Case No. 3747**

Piping Systems

A recently completed power house and central heating plant emphasizes the economies made possible by the use of the oxy-acetylene process as applied to the installation of industrial piping. Savings in cost of materials amounted to over 30 per cent, due to the fact that oxwelded construction eliminated over 800 costly fittings. The oxwelded installation as a whole cost 43 per cent less than installation by any other method and assured a one-piece tailored job, with no extras for upkeep. Case No. 4087**

Hoppers

Cost estimates kept on hoppers for a forced draft dust collecting system redesigned for oxwelded construction showed the following advantages over previous fabricating methods: 1. Required less than 50 per cent of the drafting time on details. 2. Required 90 per cent less layout time. 3. Saved 75 per cent of the expense in the pattern room. 4. Reduced material requirements by 18 per cent. 5. Eliminated operating troubles due to draft leakage with former construction. Case No. 2975**

Stainless Steel Equipment

Oxwelding proved the only method of construction which rendered completely effective the desirable qualities of 18-8 stainless steel used for milk collecting tanks for a chocolate manufacturer. Other methods of fabrication by their very nature made it difficult to completely sterilize the containers. Oxwelded joints are permanently tight and entirely free from all crevices, cracks and even microscopic openings where bacteria might lodge. Case No. 5047**

Loud-Speakers

Redesign of loud-speakers for oxwelded construction enabled a manufacturer of theatre equipment to develop a lighter, stronger speaker and cut his production costs. Speakers were formerly made of 16-gauge iron and all corners had a heavy angle or channel iron mechanical construction, giving the unit a total weight of 500 lbs. The redesigned horn weighs 150 lbs., light enough for ready portability, is fully as strong as the previous model and is considerably cheaper to fabricate. The new design calls for 22-gauge iron, completely cut to shape with the oxy-acetylene blowpipe and all joints are oxwelded. Case No. 4288**

For Your Design Department

Oxwelded construction removes limitations in design imposed by older methods of fabrication. Joints can be located for most convenient fabrication without serious regard to service stress. Oxwelded joints can be made to pass any necessary requirements for strength and ductility. Oxwelding assures the full rated strength of the metal used. It does not weaken the structure it fabricates. Oxwelding frees the designer from limitations of size and shape. Odd-shaped blanks can be made with welded joints and worked in that condition. This often makes possible the use of stock size sheets by the simple process of welding on a section to accommodate a projection in design. You can obtain these and other inherent advantages of oxwelding without serious breaks in production or large outlay of capital.

**Complete data on any of these examples may be had by referring the case number to the nearest Linde District Office. If you are discarding good designs because older methods of construction make them uneconomical to produce, the vast experience of The Linde Air Products Company in the development and application of the oxy-acetylene process can be of real help to you. Write or phone today.

THE LINDE AIR PRODUCTS COMPANY
Unit of Union Carbide and Carbon Corporation
126 Producing Plants UCC 627 Warehouse Stocks
IN CANADA: DOMINION OXYGEN COMPANY, LTD., TORONTO

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Atlanta	Detroit	New York
Baltimore	El Paso	Philadelphia
Birmingham	Houston	Pittsburgh
Boston	Indianapolis	St. Louis
Buffalo	Kansas City	Salt Lake City
Chicago	Los Angeles	San Francisco
Cleveland	Milwaukee	Seattle
Denver	Minneapolis	Tulsa

LINDE OXYGEN • PREST-O-LITE ACETYLENE • OXWELD APPARATUS AND SUPPLIES • UNION CARBIDE

Dayton Rubber Mfg. Co., 2345 West Riverview Avenue, Dayton, Ohio, manufacturer of automobile tires, etc., is considering erection of new power plant. Cost over $60,000 with equipment. A. M. Kinney, Inc., Carew Tower, Cincinnati, is consulting engineer.

Gulf Refining Co., Frick Annex, Pittsburgh, has plans for new bulk oil storage and distributing plant at Cleveland, including steel tanks, pumping plant and other equipment. Cost about $75,000.

Huebner-Toledo Breweries, Inc., Toledo, Ohio, recently organized by group of brewery interests, headed by J. H. Harris, president, Forest City Brewing Co., Inc., 6922 Union Avenue, Cleveland, plans expansion and improvements in former Toledo brewery, with additions to provide capacity of 500,000 bbl. a year. Cost close to $400,000 with equipment.

City Council, Wilmington, Ohio, plans installation of electric-operated pumping machinery and other equipment for new sewage disposal plant and system. Cost about $250,000 with machinery.

City Council, Newcastle, Ind., is planning expansion and improvements in municipal electric light and power plant. Financing in amount of about $448,000 will be arranged, including equipment purchases.

Richard Lieber Brewing Corpn., Indianapolis, recently organized by Richard Lieber and associates, has taken over Midwest Brewing Co., 1254 South West Street, and will expand to increase capacity to more than 175,000 bbl. a year. Company is arranging stock issue of about $600,000, considerable part of fund to be used for program.

Glaze Mfg. Corpn., Andrews, Ind., has been organized by Bruce Glaze and O. K. Gleason, Andrews, to manufacture mechanical equipment and operate a general machine works.

Board of School Commissioners, 150 North Meridian Street, Indianapolis, asks bids until Aug. 2 for boilers and equipment for school on Park Avenue.

Goebel Brewing Co., Rivard and Maple Streets, Detroit, plans erection of new brewhouse and power plant in connection with improvements in present brewery. Cost over $175,000 with machinery. Harley & Ellington, Inc., Stroh Building, is architect.

City Council, Petoskey, Mich., has plans for extensions and improvements in municipal electric light and power system. Cost about $30,000 with equipment. City engineer in charge.

May Screw & Mfg. Co., Detroit, has been organized by P. B. May, 642 Gladstone Avenue, and associates, to manufacture screw machine products and kindred equipment. Company will take over May Screw Products Co., 2157 Howard Street.

Stehr Piston Ring Co., San Diego, Cal., manufacturer of multiple segment piston rings and allied automotive specialties, has leased building at 7049 Lyndon Street, Detroit, about 600 sq. ft. floor space, for new plant. Works will be removed from San Diego to new location and capacity increased.

Contracting Officer, Material Division, Wright Field, Dayton, Ohio, asks bids until Aug. 7 for propeller hub retaining nuts, propeller hub cones, propeller rings, propeller spacers, etc. (Circular 5).

MIDDLE WEST

Chicago Flexible Shaft Co., 5602 West Roosevelt Road, Chicago, manufacturer of flexible shafts and kindred equipment, has let general contract to S. N. Crowen Associates, 221 North La Salle Street, for one-story addition, 28 x 200 ft.

Central Breweries, Inc., 1800 Broadway, East St. Louis, Ill., plans extensions and improvements, including new brewing, bottling, mechanical-cooling and other equipment. Cost over $200,000 with machinery. Company was organized recently with capital of $1,000,000 by J. Harry Rehme and Kirke L. Bonnell.

Super-Vent Fan & Mfg. Co., 603 South Marshfield Avenue, Chicago, has been organized by James Karageorge and associates, to manufacture mechanical fans and equipment.

Red Wing Brewing Co., Inc., Red Wing, Minn., recently organized by D. H. Mintz, president, Twin City Supply Co., 177 East Third Street, St. Paul, plans extensions and improvements, including brewing, bottling, pasteurizing, sterilizing and other machinery. Cost about $200,000 with equipment. Harry Whitsell, 964 Berry Avenue, St. Paul, is engineer.

Common Council, Central City, Neb., is planning new municipal electric light and power plant. Cost about $75,000 with equipment.

Rock Island Brewing Co., Rock Island, Ill., recently organized to take over company of same name with plant at Seventh Avenue and Thirtieth Street, is planning extensions and improvements, including increased storage and distributing facilities. Company has arranged for stock issue of about $550,000, part of fund to be used for work. Chester A. Mitchel is president.

Faries Mfg. Co., Decatur, Ill., manufacturer of metal lighting fixtures and equipment, has taken over Henkel Edge-Lite Corpn., 357 North LaSalle Street, Chicago, manufacturer of lighting specialties, bathroom fixtures, etc., and will consolidate, operating as Edge-Lite Division, expanding production.

Youngstrom & Youngblood Co., 210 East Walnut Street, Des Moines, Iowa, manufacturer of pneumatic tools and kindred equipment, is considering new one-story unit. Cost about $21,000 with equipment.

Talky-Tyres Division of Geuder, Paeschke & Frey Co., Milwaukee, has been formed to manufacture animated steel signs for use in connection with billboards, curb, interior and other signs. A. A. Henkel is manager of this division.

PACIFIC COAST

Old Mission Brewing Co., Corporation Building, Los Angeles, recently organized by D. A. Pepp and F. E. Keeler, has acquired property at Culver City, Cal., as site for new plant. Plans are under way for initial unit, multistory, 150 x 180 ft. Cost about $160,000 with equipment.

State Department of Public Works, Public Works Building, Sacramento, Cal., George B. McDougall, State architect, same address, in charge, has plans for new power plant at State institution at Camarillo, Cal. Cost over $45,000 with equipment.

Board of County Supervisors, Hall of Records, Los Angeles, is planning erection of new mechanical and engineering building in Civic Center. Cost about $1,250,000 with equipment. New power house is planned at general hospital, and addition to County equipment storage and distributing plant, to cost about $25,000 and $70,000, respectively. William Davidson, address noted, is mechanical engineer for board, in charge.

Canny Brewing Co., 1927 Third Street, Seattle, James E. Canny, president, recently organized, is planning new brewery at Chehalis, Wash. Cost about $115,000 with equipment.

City Council, Yakima, Wash., plans installation of pumping machinery and other equipment, pipe lines, etc., for extensions and improvements in municipal water system. Cost about $260,000.

T. E. Anderson Packing Co., Lindsay, Cal., plans rebuilding part of citrus fruit packing plant recently destroyed by fire. Loss over $40,000 with equipment.

Long Beach Harbor Commission, Long Beach, Cal., has authorized construction of new air marine base in Outer Harbor, with hangar unit, repair and reconditioning shop, and other structures. Cost about $150,000.

Constructing Quartermaster, Benton Field, Cal., is securing appropriation of $243,000 under National Industrial Recovery Act for erection of new air corps depot shops at local field, including equipment, and plans call for bids soon.

City Council, Clovis, Cal., is planning erection of municipal electric distributing system. Cost over $40,000 with equipment. Edward K. Hussey, Syndicate Building, Oakland, Cal., is consulting engineer.

FOREIGN

British Titan Industries, Ltd., a subsidiary of Imperial Chemical Industries, Ltd., Billingham, England, has purchased 7-acre tract near Haverton Hill-on-Tees, England, for manufacture of paints, oils, etc. Project will include installation of steel pipe line from works of parent company to new plant for sulphuric acid supply. Cost over $200,000 with equipment.

Senor Gumaro Lazarraga, Matamoros, Mexico, has secured permission from Government Department of Communications, Mexico City, to build new 500,000-watt radio broadcasting plant at Matamoros. Cost over $300,000 with steel towers, generating plant and operating equipment.

Reichsbahn (German Federal Railways Co.), Berlin, Germany, is arranging fund of 510,000,000 Rm. (about $174,420,000) for improvements and repairs to rolling stock, repair shops and other works structures during next 12 months. Program will give employment to about 250,000 shop operatives.

Grain Sand Structure and Mold Permeability Control

(*Concluded from Page* 11)

mixing two different sizes of sand grains at the same time; the permeability of a three adjacent size mix; and the permeability of a three non-adjacent size mix, showing how the permeability is decreased by the scatter or distribution of sand grains.

Several conclusions are given by the authors, among them the following:

At least 20 per cent higher permeability values in both molding sand and baked cores are assured by rounded sand grains than by angular ones, assuming other conditions to be the same.

The baked strength of oil-bonded cores made from spherical sand grains is greater than cores made from angular sand grains.

The green and dry strengths of molding sand are not affected within practical limits by the shape of the sand grains.

The base permeability of various grain sizes does not change rapidly until grain size increases above 140 mesh, above which size each increase of sieve size will give an increasingly greater base permeability.

A 10 per cent addition of a much finer size sand grain than the base material may cause permeability of production sand to drop 50 per cent, which accounts for the phenomenon that green or mold permeability drops or "closes up" so readily in practice.

A 70 per cent addition of a finer sand grain material than the base material will cause base permeability of production sand to drop very close to base permeability of the fine material added.

The permeability power of a fine material is large and is sufficient to control the permeability of a sand entirely, so long as 30 per cent or more of fine material is present.

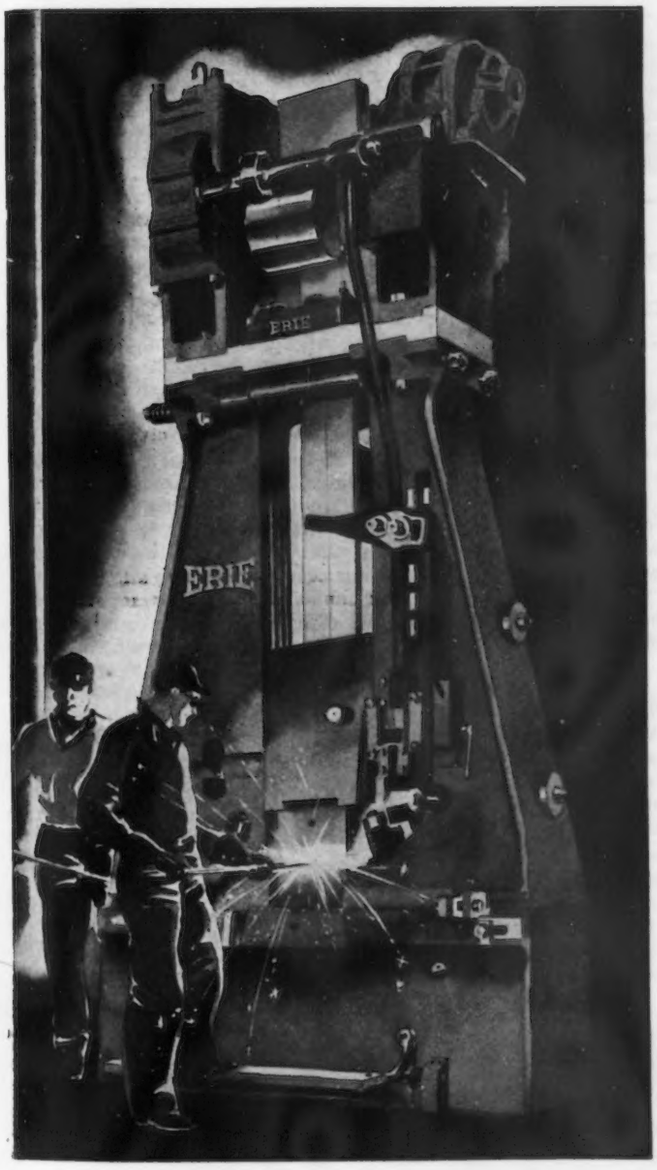
Fine sand grains have a greater influence on the permeability of a sand than do coarse sand grains, and thus have a greater permeability power.

When three sand grains from three adjacent sieves are mixed in equal portions, the resultant base permeability will not be the average of the base permeability values for the various sand grains mixed, but much lower—approximately 66 per cent of the average base permeability values. As the scatter or distribution increases in spread, then the base permeability of a sand is reduced materially.

When the coarse material is not of an adjacent sieve size to base material and the percentage of coarse material is less than 30 per cent, then the coarse material will not help to increase the base permeability.

Cutler-Hammer, Inc., Milwaukee, reports shipments for the quarter ended June 30 at $850,325 compared with $585,480 in the preceding three months.

How Will the Recovery Act Affect You?



STEAM DROP HAMMERS—BOARD DROP HAMMERS
FORGING AND TRIMMING PRESSES
SINGLE- AND DOUBLE-FRAME HAMMERS

While the Recovery Act may ban cutting prices below cost of production—the production cost which will be used as a gage will not be the high cost that exists in many forge shops due to inefficient machinery.

Many forge shops have been preparing themselves for the new deal which the forging industry admittedly needs. They have been doing this by replacing high-cost machines with modern Erie labor-aiding forging equipment. A specific example of the latter is the Erie board drop hammer of improved frame design, and flexibility due to the Variable Stroke Control.

Are you ready to meet the new deal?

ERIE FOUNDRY COMPANY

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PARIS, FRANCE 8 RUE DE ROCROY

ERIE

New Development Lower Cost of Continuous-Furnace Brazing

(*Concluded from Page* 16)

The area involved in the brazed joint of the pulleys mentioned above was only 0.77 sq. in., as the flange of the hub had been reduced from 2⅜ in. in diameter to 1½ in. in diameter when the brazing process was adopted to replace the projection welding process formerly used to join the parts. With the previous method of joining by projection welding at four points in the wider flange, a number of failures in service had been encountered due to crystallization of the steel in the immediate vicinity of the welded portion and to strains set up in the steel from localized heating at very high temperatures. Breaking of the crystalline structure around the outside of the welds occurred and was caused by fatigue from vibration of the parts at high operating speeds. The brazed pulleys are uniformly heated to a normalizing temperature of 1740 deg. F., thus relieving all cold working strains from drawing, punching, and spinning operations, at the same time the brazing operation is performed. While the cost of projection welding is slightly lower than brazing in the average pulley, the improvement in quality is believed to justify the slight increase in cost. A final economy is found in the average pulley assembly because hubs can be produced from much smaller bar stock than was possible with the old types of assembly.

Braze and Heat Treat Simultaneously

It is entirely practical to anneal or heat treat brazed assemblies at the same time as the brazing operation is performed. Reheating for quenching or drawing separately after the parts have been brazed is also possible, if such reheating is at temperatures lower than the brazing temperature used in joining the parts. Tennis racquet frames of S.A.E. 4130 sheet steel have been brass-wire brazed at a temperature of 1740 deg. F. and quenched in water after dropping the temperature of the frame to 1600 deg. F., with very satisfactory results and with no apparent change in the brazed joint.

Where it is desired to cover the entire surface of steel parts with a coating of copper or where the joints are not accessible to the application of wire, the copper may be applied by means of a spray gun or a brush with a paste made up of the copper powder and lacquer or lacquer thinner.

It is possible to braze almost any desired number of joints in any assembly within the limits of possibility of holding the parts together during the brazing operation. The most intricate parts or assemblies are made actually to grow together, and joints are made which are even stronger than the original parts. Products requiring several stampings joined together or calling for screw machine parts, forgings and stampings to complete the unit may be neatly and economically joined by the continuous brazing furnace method right in the production line. Many products now difficult or expensive to make in one piece can be made in several pieces and brazed, thus reducing the cost and improving quality and appearance.

Indiscriminate Use of Corrosion Test

(*Concluded from Page* 23)

makes it possible to weld 18-8 so rapidly that no tempering effect takes place. With this method of welding composition is relatively unimportant.

When experience can be used as a guide, and when laboratory tests duplicating service conditions indicate the condition, it may be found necessary to anneal even the most stable composition after welding. For example, none of the so-called stable compositions including titanium or columbium-bearing alloys, and also those alloys which have been "stabilized"—a term which apparently is as descriptive as the word "permanent" in the language of a hairdresser—can be used for hot concentrated nitric acid, unless the welding operation is followed by final anneal.

The columbium bearing alloy which is perhaps the most stable of all, as measured by the results of the Krupp reagent in conjunction with long time thermal exposures, will show at the area adjacent to the weld a loss of five to ten times higher than that which is shown on the original material in hot concentrated nitric acid.

In conclusion, the writer wishes to point out that the results obtained by the sulphuric-acid-copper-sulphate test can be used, in conjunction with service experience, to great advantage in predicting what may occur in service, particularly when the service is at normal temperatures and welding is involved, and the test has been made on samples which have been subjected for a short time only to temperatures in the carbide dissociation range. Even under these conditions it must not be assumed, if failure does not occur in this reagent, that no dissociation was resulted, because in many cases other active corroding agents show a distinct line of attack adjacent to the weld. The amount of dissociation, however, may not be great enough, with less active corroding agents, to prove harmful.

When however, we are dealing with high-temperatures service in the dissociation range under corrosive conditions, where the time of exposure is very long, then the results of the sulphuric-acid-copper-sulphate tests become of very doubtful value. Under these conditions because differences in potential in the various parts of the alloy have been eliminated or so reduced that the Krupp reagent fails to produce disintegration, it is no criterion that intercrystalline corrosion will not occur, when this alloy is subjected simultaneously to temperatures in the dissociation range and active corroding agents. And again, even if the alloy were not susceptible to intercrystalline corrosion, its corrosion resistance has been so impaired that failure from general corrosion is likely to occur in a very short time.

It is not the writer's intent to disparage any accelerated test which is intelligently applied and standardized against known service conditions, but to point out that the indiscriminate use of any accelerated test may prove more harmful than beneficial.

FRANKLIN INSTITUTE has awarded the John Price Wetherill Medal to Industrial Brownhoist Corpn. for the design and construction involved in the machine pictured above. It is a railway ballast cleaner and has helped solve a serious railway maintenance problem.

NINTH YEAR OF SERVICE TO THE METAL WORKING INDUSTRY

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THE IRON AGE

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CHROMIUM
HIGH-CARBON FERROCHROME (MAXIMUM 6% CARBON)
LOW-CARBON FERROCHROME (IN GRADES, MAXIMUM 0.06% TO MAXIMUM 2.00% CARBON)
CHROMIUM METAL
CHROMIUM-COPPER
MISCELLANEOUS CHROMIUM ALLOYS

SILICON
FERROSILICON 15%
FERROSILICON 50%
FERROSILICON 75%
FERROSILICON 80 TO 85%
FERROSILICON 90 TO 95%
REFINED SILICON (MINIMUM 97% SILICON)
CALCIUM-SILICON
CALCIUM-ALUMINUM-SILICON
ALCIUM-MANGANESE-SILICON
SILICON-COPPER
ISCELLANEOUS SILICON ALLOYS

MANGANESE
NDARD FERROMANGANESE 78 to 82%
W-CARBON FERROMANGANESE
IUM-CARBON FERROMANGANESE
MANGANESE METAL
MANGANESE-COPPER
CELLANEOUS MANGANESE ALLOYS

SILICO-MANGANESE
LL GRADES INCLUDING SILICO-SPIEGEL

TUNGSTEN

VANADIUM
ALL GRADES

ZIRCONIUM
ALUMINUM - ZIRCONIUM
35 to 40% ZIRCONIUM
12 to 15% ZIRCONIUM
ZIRCONIUM-MANGANESE-SILICON

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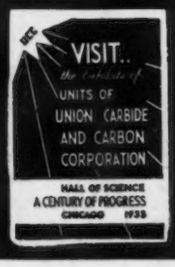

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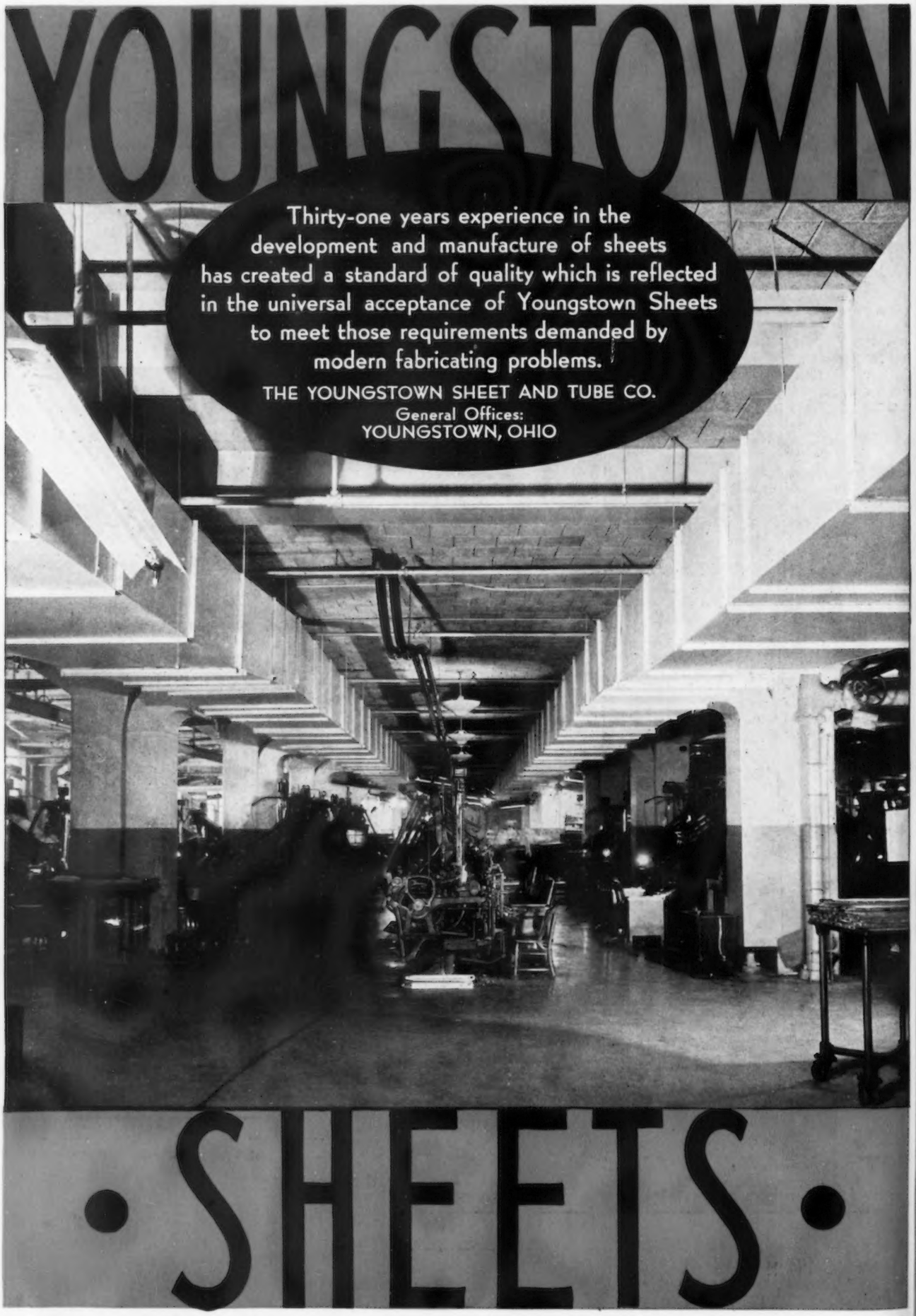
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